COMMUTING IN A NEW CENTURY

Phase 2 Report: Research Themes for the Program for Mass Transportation

Executive Office of Transportation and Construction,
Commonwealth of Massachusetts

In cooperation with the
Massachusetts Bay Transportation Authority

In consultation with the
Executive Office of Communities and Development
Massachusetts Bay Transportation Authority Advisory Board
Massachusetts Highway Department
Metropolitan Area Planning Council

With the assistance of the
Central Transportation Planning Staff

The Commonwealth of Massachusetts
Executive Office of Transportation & Construction
Office of the Secretary
10 Park Plaza, Room 3510
Boston, MA 02116-3969
Telephone 973-7000
TDD (617) 973-7306
Telefax (617) 523-6454

William F. Weld
Governor

Argeo Paul Cellucci
Lieutenant Governor

Richard L. Taylor
Secretary

March 31, 1992

Daniel Greenbaum, Commissioner
Department of Environmental Protection
One Winter Street
Boston, Massachusetts 02108

Dear Commissioner Greenbaum:

The attached report is being submitted as the second stage of planning efforts which comply with 310 CMR 7.36 (6) (a) - Transit Systems Improvements - promulgated by DEP on December 6, 1991. The Program for Mass Transportation (PMT) Phase 1 Report was submitted to your office on December 31, 1991.

During Phase 2 of the PMT process, we have categorized the suggestions received from all sources and, in consultation with our working and advisory committees, have created a series of research themes. These themes will guide the detailed analysis of Phase 3.

I think you will find that the document is consistent with the regulations. Please contact Robert Sloane, EOTC Assistant Secretary, at 973-7142, if you require further information about the document.

Sincerely

Richard L. Taylor
Secretary of Transportation

Executive Summary

Overview of the Process

The "Commuting in a New Century" study, begun by the Executive Office of Transportation and Construction (EOTC) in the autumn of 1991, has now completed its first two phases. Phase 1 consisted of a series of public meetings at which the study team gathered suggested improvements to the transportation system. The Phase 1 report, published at the end of December 1991, gave the results of this public process.

Phase 2 served primarily as a transition between the large collection of suggestions gathered from the public in Phase 1 and an intensive analysis of the most promising of these suggestions in Phase 3. This Phase 2 report prepares for Phase 3 by organizing the suggestions into "Research Themes."

Phase 3, which begins on April 1, 1992, will include an intensive analysis of the most promising project suggestions and an identification of future demands. This study will propose a list of projects that seeks to integrate transit and automobile use with other modes of travel such as water transit use, pedestrian travel and bicycle use. Emphasis will be placed on identifying projects that enhance and reinforce the intermodal connections among existing modes of travel now provided by the public and private transportation agencies.

The efforts of Phase 3 will lead to the adoption of a new Program for Mass Transportation by June 30, 1993. This new PMT will contain a list of projects to meet the future transportation needs of the region for the next two decades. The adopted PMT will be further refined in Phase 4, during which time it will be coordinated with the revision of the State Implementation Plan to meet the requirements of the Clean Air Act amendments.

Product of Phase 2: Research Themes

The title of this report is "Research Themes for the Program for Mass Transportation." Phase 1 had yielded a large number of suggestions which were organized in the Phase 1 report according to mode, area, and type of suggestion. For the purpose of analysis in Phase 3, these proposals needed to be reorganized by functional category. These categories, called research themes, allow a variety of projects which would have similar effects on the system to be analyzed together and compared. Comparisons between the various modes which can serve a specific type of travel demand are necessary in order to plan the most effective system possible. They also assist policy makers in determining the most needed changes to the system and to give them highest priority.

The scope of the research themes goes beyond what is traditionally thought of as mass transit. Federal legislative mandates and the results of the public input process both give impetus to a broader transportation perspective. Intermodal connections, transportation demand management and the regional HOV system are three examples of research themes which push against the traditional boundaries dividing mass transit from other forms of transportation.

Overview of This Report

Chapter 2, The Regional Transportation System, provides an up-to-date look at the existing transit system and the capacity and usage of the system. All public transportation services are discussed, including: rapid transit, light rail, bus, trackless trolley, commuter rail, commuter boat, suburban bus programs, private carrier bus service, CARAVAN services, paratransit, commuter parking facilities and commuter bicycle facilities.

Chapter 3, Progress Since the Last PMT, chronicles the capital projects which the MBTA has completed since 1978. This includes improvements to the rapid transit and light rail system, the bus and trackless trolley system, the commuter rail system and commuter boats. In addition, the chapter documents the projects which are currently underway but not yet completed, as well as those projects included in the last PMT which have not been implemented to date.

Chapter 4, Policy Framework, provides a mission statement and set of five policy statements. The mission of the government agencies which plan, construct, maintain and operate the transportation system of Massachusetts is to maximize the mobility of people and goods. The mission and policies taken as an integrated unit provide a basis for planning the future transportation system which maximizes mobility in the best possible way. The five transportation policies concern the following:

- Transportation System Improvements
- Economic Vitality and Regional Development
- Environmental Quality
- Energy
- Cost

While the policies are principally concerned with public transportation, they must also consider other modes of travel which are interdependent with mass transit. Non-traditional transit modes such as high occupancy vehicles bridge the gap between transit and highways, reinforcing the need to take a broad perspective of the transportation system.

Chapter 5 sets forth the seven research themes and lists a number of project suggestions under each. The grouping of suggestions by themes will enhance the ability to evaluate the relative merits of projects within each theme. The seven themes are:

- **Maintain and Upgrade the Existing System**
- **Intermodal Connections**
- **Urban Core Distribution**
- **New Radial Services**
- **Suburban Circumferential Movement**
- **Regional HOV System**
- **Transportation Demand Management**

Suggestion that are operational in nature have been listed in Appendix A. This list has been forwarded to the MBTA Operations Department for study and comment. During Phase 3 of the PMT process, a document will be produced which responds to these suggestions. Operational suggestions which are found to have capital implications will be reintroduced into the Phase 3 study and evaluated.

In addition to the PMT planning process, there are other parallel planning efforts which have been undertaken or are scheduled to be started in the near future by the MBTA and other state or federal agencies. A listing of these other planning studies are contained in Appendix B. Phase 3 of the PMT will rely on these parallel planning studies as a resource to help in determining the relevant characteristics of individual projects. When a planning study sufficiently defines the demand for, benefits and capital implications of a project, the findings from that study will be incorporated into the Phase 3 PMT evaluation process.

Table of Contents

List of Figures and Tables

FIGURES

TABLES

Chapter 1
Introduction

The "Commuting in a New Century" study, begun by the Executive Office of Transportation and Construction (EOTC) in the autumn of 1991, has now completed its first two phases. Phase 1 consisted of a series of public meetings at which the study team gathered suggested improvements to the transportation system. The Phase 1 report, published at the end of December 1991, gave the results of this public process.

Phase 2 served primarily as a transition between the large collection of suggestions gathered from the public in Phase 1 and an intensive analysis of the most promising of these suggestions in Phase 3. This Phase 2 report prepares for Phase 3 by organizing the suggestions into "Research Themes."

The seven themes, described in Chapter 5, facilitate the analysis by grouping them into areas of functional similarity. This allows a variety of projects which would have similar effects on the system and mobility to be analyzed together and compared. Comparisons between the various modes which can serve a specific type of travel demand are necessary in order to plan the most effective system possible. They also assist policy makers in determining the most needed changes to the system and to give them highest priority.

The scope of the research themes goes beyond what is traditionally thought of as mass transit. Federal legislative mandates and the results of the public input process both give impetus to a broader transportation perspective. Intermodal connections, transportation demand management and the regional HOV system are three examples of research themes which push against the traditional boundaries dividing mass transit from other forms of transportation.

This broad perspective is also reflected in Chapter 4 of this document, the Policy Framework for the transportation system. The policies are

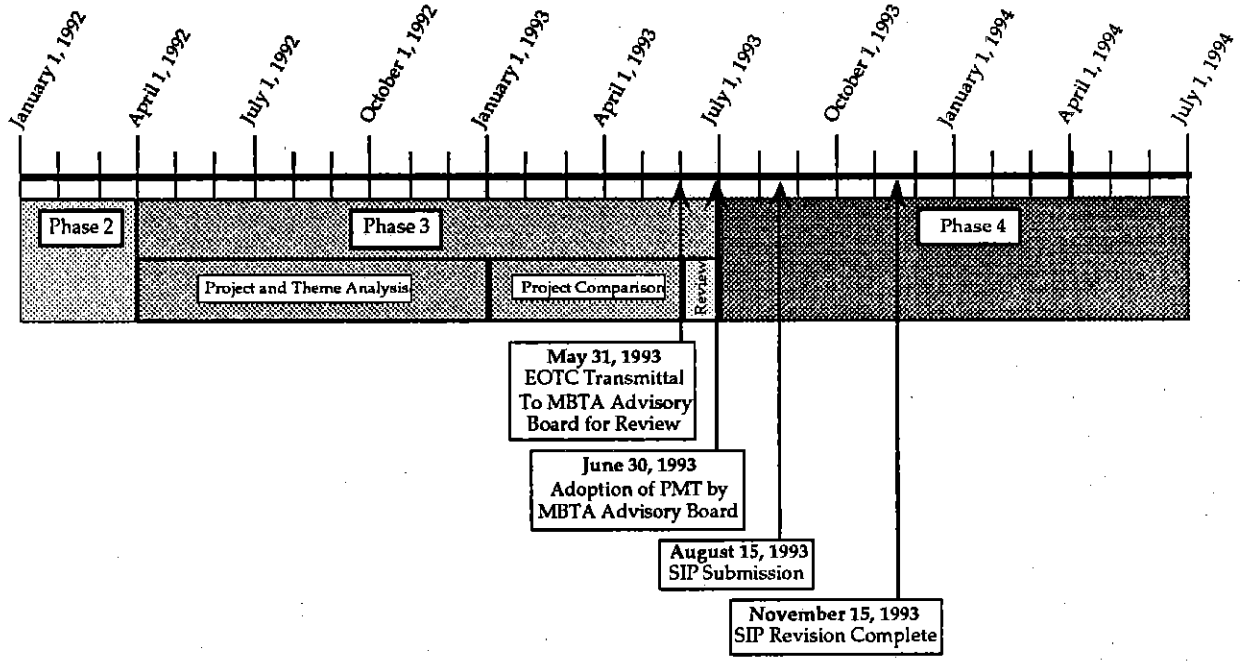
organized around a central mission of maximizing mobility of people and goods. Five major policy areas define the ways in which this mission will be pursued.

Chapters 2 and 3 give a full description of the regional public transportation system and a status report on progress made on improving the system since the time of the last Program for Mass Transportation (PMT) in 1978. This information provides the context for considering the policies set forth in Chapter 4 and the research themes in Chapter 5.

Phase 3, which begins on April 1, 1992, will include an intensive analysis of the most promising project suggestions and an identification of future demands. This study will propose solutions that integrate the traditional travel choices of highway and transit along with additional modes of travel such as water transit, pedestrian travel and the bicycle. Emphasis will be placed on identifying projects that enhance and reinforce the intermodal connections among existing modes of travel now provided by the public and private transportation agencies.

The efforts of Phase 3 will lead to the adoption of a new Program for Mass Transportation by June 30, 1993. This new PMT will contain a list of projects to meet the future transportation needs of the region for the next two decades. The adopted PMT will be further refined in Phase 4, during which time it will be coordinated with the revision of the State Implementation Plan to meet the requirements of the Clean Air Act amendments.

PMT Timeline



Chapter 2
The Regional Transportation System

The Boston metropolitan area is served by a hub-and-spoke network of rapid transit, light rail, express bus, commuter rail and commuter boat lines. These services provide high quality and cost-effective commuting alternatives to the single-occupant automobile. Express and local bus, and trackless trolley services fill in the gaps between spokes by offering line-haul service in heavily congested areas, feeder services to rail, and inter-suburban linkages throughout the region. Centralized transportation for people with disabilities, provided by the MBTA, operates in 44 communities. In addition, many communities provide local transit services for their residents and for the elderly and disabled.

This chapter describes the many transit options available in the 164 communities making up the PMT study area. Trip-making within and to the MBTA district of 78 cities and towns constitute the majority of commuting trips in this geographic area. Maps of the MBTA district and the PMT study area are shown in Figure 2-1 and Figure 2-2 respectively.

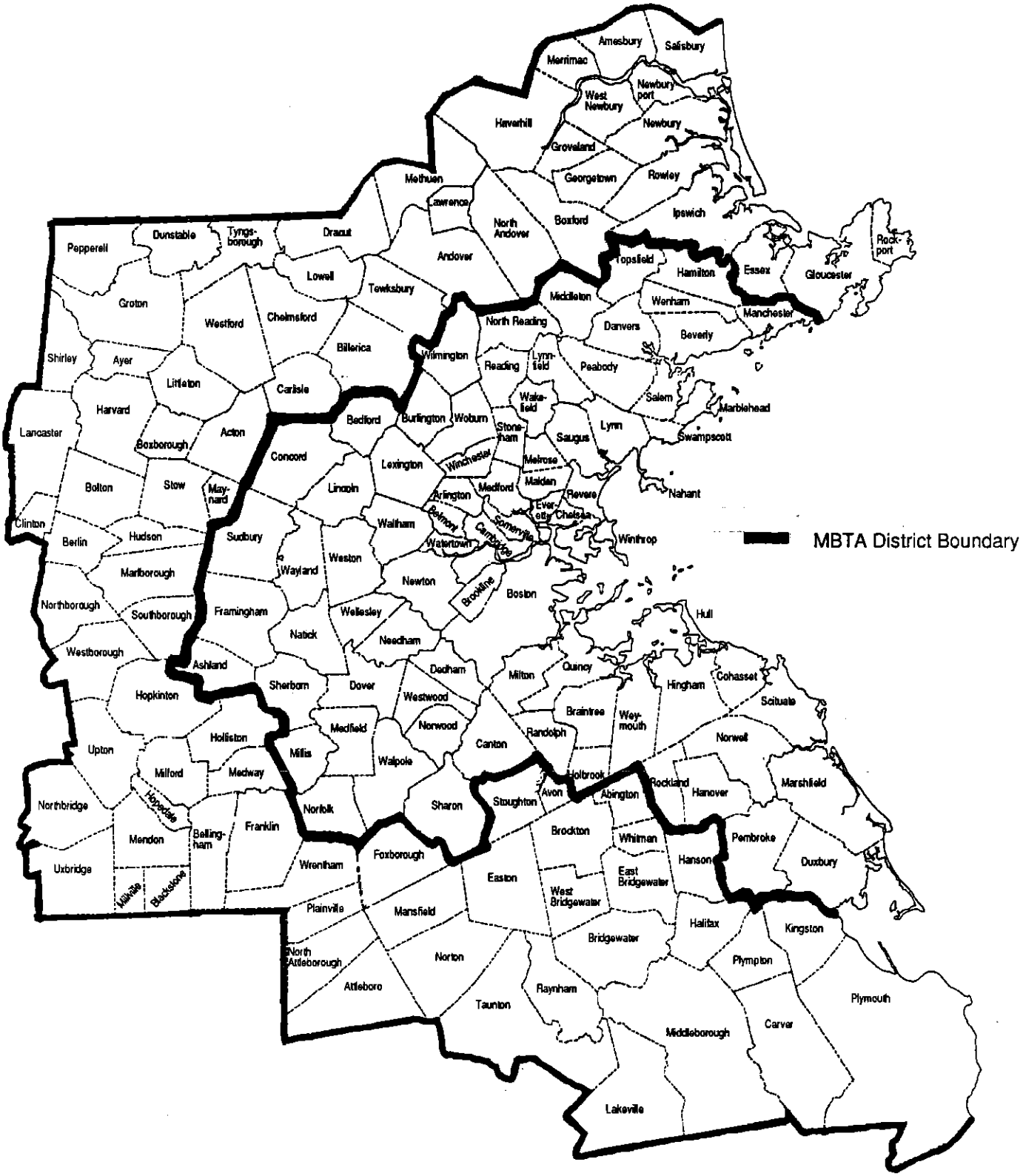
THE EXISTING TRANSIT SYSTEM

The MBTA operates a system made up of seven different modes: rapid transit, light rail, local/express bus, trackless trolley, commuter rail, paratransit vans and commuter boat. With the exception of commuter rail, all MBTA operated routes are contained entirely within the MBTA district. Commuter rail service operates on 11 lines,[1] eight of which extend beyond

[1]The Ipswich and Stoughton branches are counted separately.

Figure 2-1
MBTA Service District: 78 Communities

Figure 2-2
PMT Study Area: 164 Communities



the MBTA district. In total, 55 communities[2] are directly served, twenty of which are outside the MBTA district. In addition, 20 private carriers, 8 regional transit authorities[3] (including the MBTA) and 10 localities provide inter-district and/or local bus services throughout the study area. Three ferry routes[4] carry commuters from the Charlestown Navy Yard, Hingham and Hull to downtown Boston. Lastly, The RIDE offers accessible van service to 44 communities.

Systemwide, approximately 11,000 vehicle[5] trips are made daily between the hours of 5:00 am and 2:00 am.

Service and ridership statistics presented in this chapter were gathered from various sources including the MBTA's Ridership and Service Statistics (November 1991), and the Central Artery/Tunnel Project Regional Transit Mitigation Program, prepared by Vanasse Hangen Brustlin, Inc. for the MBTA (September 1991).

RAPID TRANSIT AND LIGHT RAIL

The MBTA rapid transit and light rail systems are comprised of 125 stations on four lines: the Red Line, the Orange Line, the Blue Line and the Green Line. All lines provide service to downtown Boston and all lines directly connect with each other, except for the Red and Blue lines (see Figure 2-3). Daily ridership on the rapid transit/light rail system is approximately 562,000 trips per weekday. (All ridership data are composite averages for FY 1991 and are reported as unlinked trips.)

Red Line Of the three rapid transit lines, the Red Line is the longest (21 miles) and the most heavily utilized, generating an average 185,000 trips per weekday. Twenty-two stations comprise the Red Line, 14 of which are accessible (improvements to Andrew station are underway). Service runs on two branches, between Alewife Station in North Cambridge and Ashmont Station in Dorchester or Braintree Station in Braintree. All service operates along a common alignment between Alewife and the JFK/UMass Station in Dorchester, at which point service branches off to

---

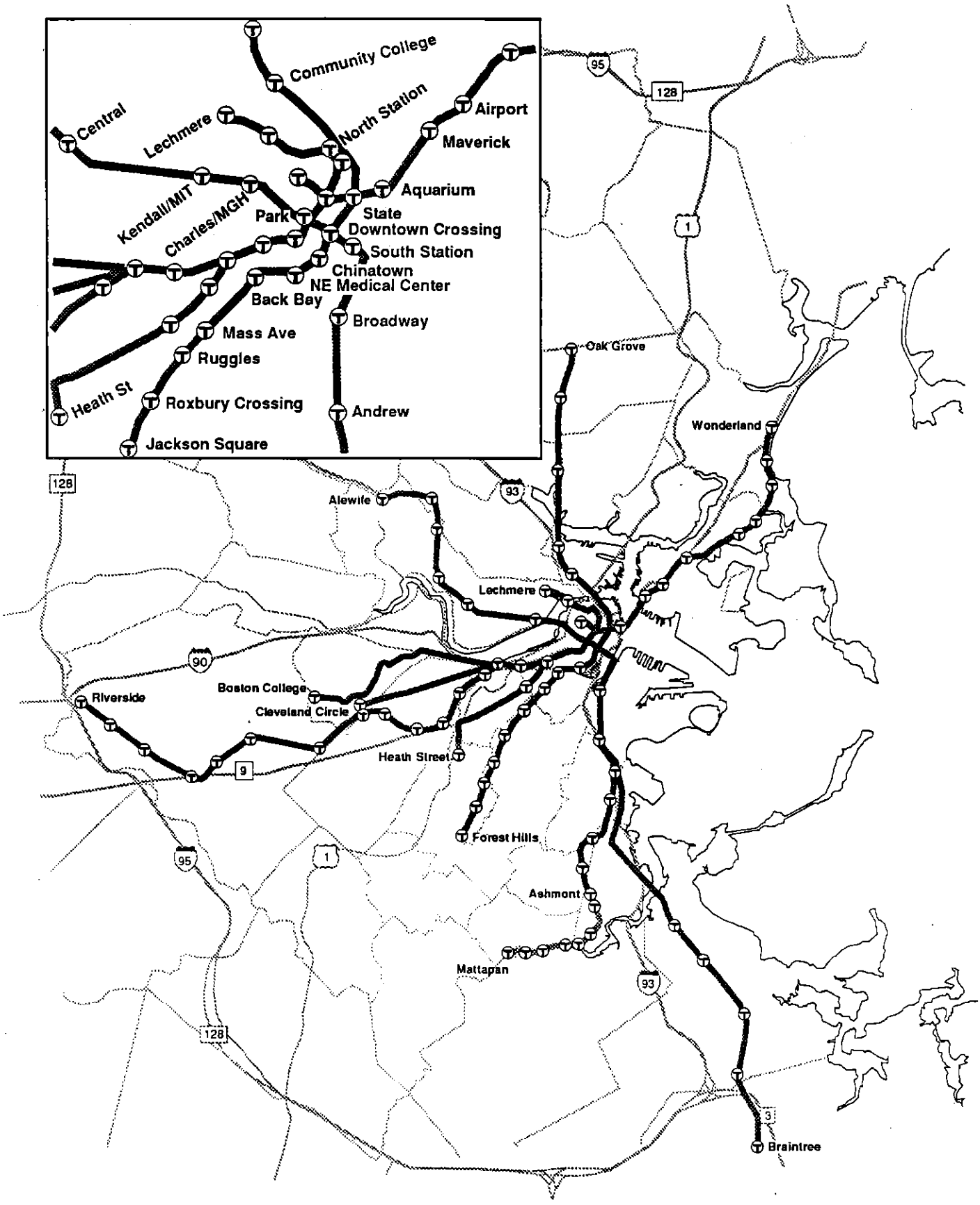
[2]Hamilton and Wenham are both considered to have direct service, although the station lies wholly within the town of Hamilton.

[3]Cape Ann, Merrimack Valley, Lowell, Montachusett, Worcester, Greater Attleborough and Brockton.

[4]A fourth route between Rowes Wharf and Logan airport is not considered a commuter service and therefore is not discussed here.

[5]A vehicle is defined as a single car. A 6-car Red Line train trip is equivalent to 6 vehicle trips.

Figure 2-3
MBTA Rapid Transit and Light Rail System



either Ashmont or Braintree. Throughout most of the day, service is split equally between the two branches. The MBTA runs 6-car and 4-car trains during the a.m. and p.m. peak hours and 4-car trains at other times. There are 214 cars in the Red Line fleet, all of which are accessible. During the peak hour, 160 passengers per car is considered design load. Park-and-ride facilities provide 8,404 parking spaces. Rush hour trains operate at 8 minute intervals from Braintree and Ashmont and at 4 minute intervals between JFK/UMass and Alewife. Average speed on the Braintree and Ashmont branches are 23.3 mph and 19.2 mph respectively. Peak hour capacity totals 12,200 passenger trips.

Mattapan High Speed Line The Mattapan High Speed Line connects with the Red Line and operates between Ashmont and Mattapan using PCC light rail vehicles. The line can be considered an extension of the Red Line in most respects, but its vehicles are maintained and operated as part of the Green Line fleet. The Mattapan High Speed Line utilizes 12 light rail vehicles, run as single cars. The line, 2.7 miles long, is comprised of eight stations, 299 parking spaces and generates 7,000 passenger trips per weekday.

Orange Line The Orange Line is 11 miles long and operates between Oak Grove in Malden and Forest Hills in Jamaica Plain. At nineteen stations, 13 of which are accessible, 127,000 trips are generated each day. The segment between Chinatown and Forest Hills, relocated in 1987, is approximately 4.7 miles long with eight stations. This portion shares its right-of-way with commuter rail, which also stops at three of the eight stations. The Orange Line fleet consists of 120 vehicles, all of which are accessible. During the peak hour, 130 passengers per car is considered design load. Park-and-ride facilities provide 2,629 spaces. The MBTA runs 6-car trains during the a.m. and p.m. peak hours and 4-car trains at all other times. Rush hour trains operate at 5 minute intervals at an average speed of 20.2 mph. Peak hour capacity is approximately 9,400 passenger trips.

Blue Line The six mile long Blue Line is the shortest of the three rapid transit lines and operates between Wonderland Station in Revere and Bowdoin Station in the Government Center area of Boston. Twelve stations, two of which are accessible, generate 54,000 weekday trips. The Blue Line fleet consists of 70 cars, all of which are accessible. During the peak hour, 95 passengers per car is considered the design load. Park-and-ride facilities provide 2,334 spaces. Rush hour trains operate at 3 minute intervals at an average speed of 18.7 mph. All trains are 4 cars in length at all times. Peak hour capacity totals 7,600 passenger trips.

Green Line The Green Line, which uses light rail vehicles (LRVs), generates approximately 189,000 trips per weekday over 23 miles of track. The line has 13 stations in subways or along the elevated viaduct, and 57 surface stops on four branches to the west and southwest of downtown Boston: the Boston College branch (B Line), the Cleveland Circle branch (C Line), the Riverside branch (D Line), and the Arborway branch (E Line). None of the stations or stops is accessible. All branches operate to their named terminals with the exception of the Arborway branch which now terminates at the intersection of Heath Street and South Huntington Avenue. The northern terminus of the Green Line is at Lechmere Station in Cambridge, but only Heath Street/Arborway trains operate that far. Because ridership north of downtown Boston is much lower than to the west and southwest, Boston College and Riverside trains turn around at Government Center, and Cleveland Circle trains turn around at North Station. There are 217 LRVs in the Green Line fleet, none of which are accessible. During the peak hour, 110 passengers per car is considered design load. Park-and-ride facilities provide 2,123 spaces. Rush hour trains operate at 5 to 8 minute intervals on the four branches and at 1.3 minute intervals between Copley and Government Center stations. Peak hour capacity totals 9,800 passenger trips.

Improvements to the rapid transit system have resulted in increased capacity and better service coverage. Examples include the new Orange Line and the Red Line Extension to Alewife. In addition, the MBTA completed station modernizations and platform extensions to accommodate 6-car trains on the Red and Orange lines thereby increasing peak hour capacity by 50 percent. (Planning has already begun to extend Blue Line platforms to accommodate six car trains.) Between FY 1986 and FY 1991, A.M. peak period deployment has been increased from 248 to 312 cars on the Red, Orange, and Blue lines, and from 101 to 142 cars on the Green Line and Mattapan High Speed Line (see Table 2-1). Overall peak period frequency of service from the termini on these rapid transit and light rail lines range from 3 to 8 minutes.

In addition, major track improvements were recently completed on the Red and Green lines, as well as power and signal improvements on the Green Line, in order to improve the reliability of those lines. Work has recently begun on a relocation of the Green Line between North Station and Lechmere to replace the current elevated service with subway service, and to provide cross platform connections with the Orange Line and improved connections with commuter rail at the new North Station. For a more detailed discussion of past improvements and those currently underway see Chapter 3.

Table 2-1
Rapid Transit and Light Rail Lines Peak Period Service Levels (FY 1992)

	Fleet Size (# Cars)	Trains	Consist (# Cars/ Train)	Peak Service Req'mt (# cars)	Headway (Minutes)
RED LINE	214	29	4, 6	150	4
Ashmont		7	4	28	8
		5	6	30	
Braintree		5	4	20	8
		9	6	54	
Run-as-Directed		3	6	18	
MATTAPAN	12	6	1	6	4
ORANGE LINE	120	17	6	102	5
BLUE LINE	70	15	4	60	3
GREEN LINE	217	75	1-2	136	1.3
Boston College		21	2	42	5
Cleveland Circle		14	2	28	6
Riverside		16	2	32	6
Reservoir		10	1	10	6
Heath Street		10	2	20	8
Run-as-Directed		4	1	4	

Note: 1.3 minute Green Line headway is between Government Center and Copley, and 4 minute Red Line headway is between Alewife and JFK/UMass.

BUS AND TRACKLESS TROLLEY

The MBTA operates 159 bus routes throughout the MBTA district, including four trackless-trolley lines in Cambridge, Watertown and Belmont. In FY 1991, total bus ridership was approximately 360,000 trips per weekday.

Nearly all routes connect with the rapid transit system at, at least, one location. In areas closer to Boston, buses provide crosstown service, feeder service to rapid transit stations, and line haul service in heavily congested areas. Further out, buses provide local service and connections to rapid

transit and some commuter rail lines. There are 952 buses and 38 trackless trolleys in the MBTA's active fleet, of which 473 are lift equipped.

The MBTA operates express bus routes service from 11 communities: Newton, Watertown, Waltham, Medford, Burlington, Woburn, Lynn, Marblehead, Salem, Saugus and the Boston neighborhood of Brighton. Specific routes include the 300, 301, 302, 304, 304A, 305, 325, 326, 352, 353, 354, 426, 441, 442, 450, and 455. (See Figure 2-4). Note that at Central Square in Lynn the 441/442 and the 455 routes become the 440 and the 400 respectively. In 1991, typical weekday boardings on all express routes totaled 25,300 trips.

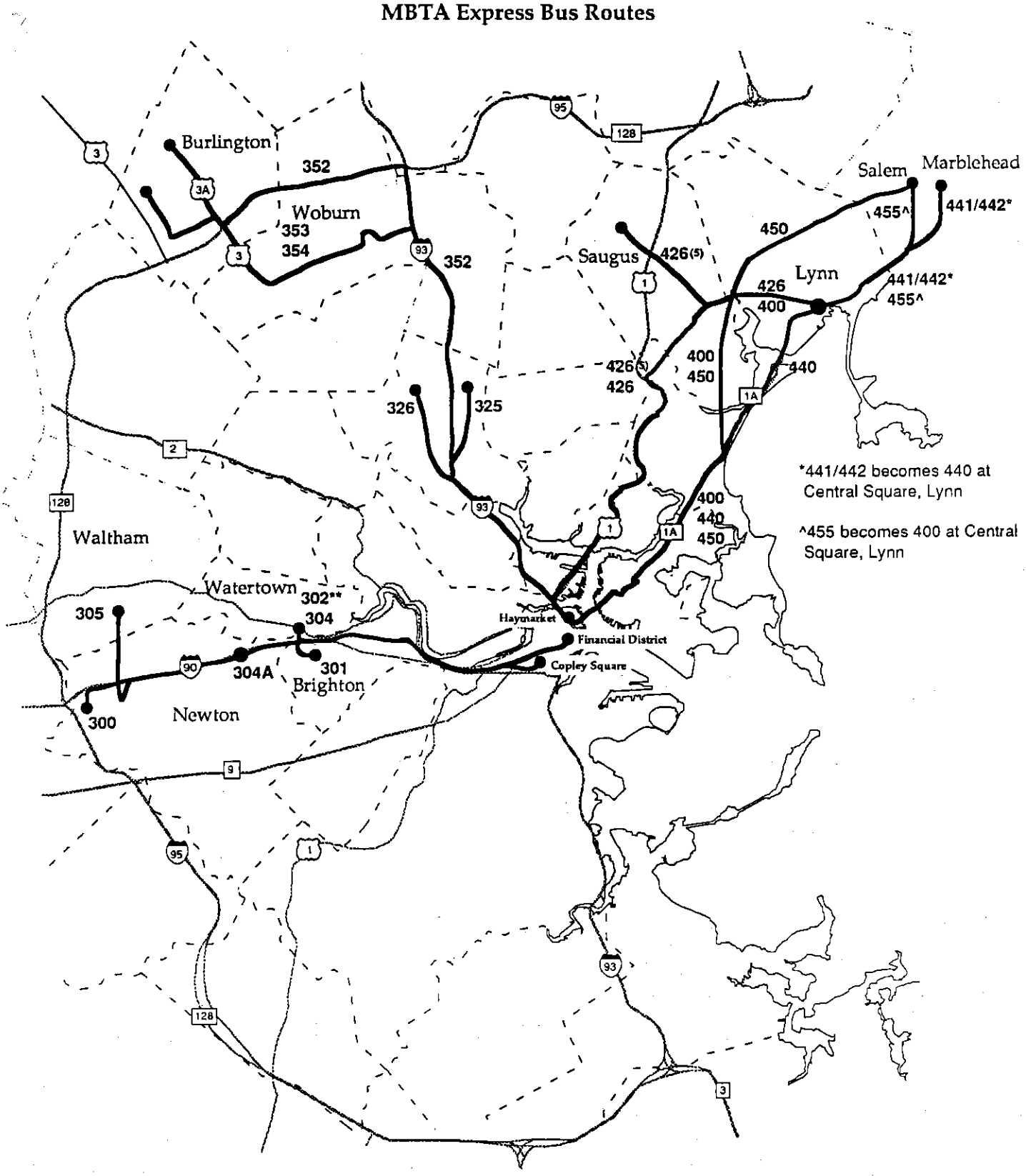
Buses serve over 10,000 stops, 314 of which are equipped with bus shelters. One park-and-ride lot in Arlington provides 194 parking spaces. The present MBTA bus network consists mostly of routes taken over from several previous operators. Most of these routes have long histories, and many had their origins as streetcar lines built before 1900. Schedules and route alignments have been revised gradually over the years, but most continue to operate along the same general alignments in response to continuing demand. A list of MBTA bus routes and FY 1992 service levels is shown below in Table 2-2. (Note: several MBTA bus routes that serve specific industrial areas are not listed in the table.)

COMMUTER RAIL

The 265-mile commuter rail network is comprised of 11 radial lines, with 101 stations, 39 of which are accessible. In FY 1991, daily ridership is approximately 74,600 trips per day. The commuter rail system is split into two sides. The Mass. Turnpike can be considered the dividing line between North and South side service: all routes north of the Mass. Turnpike – the Rockport, Ipswich, Haverhill, Lowell, and Fitchburg lines operate to and from North Station. Lines along the Mass. Turnpike or to the south – the Framingham, Needham, Franklin, Attleboro/Providence, Stoughton, and Fairmount lines – operate to and from South Station. All southside lines except the Fairmount Line also serve the Back Bay Station. A map of the commuter rail network is shown in Figure 2-5.

The commuter rail fleet consists of 52 locomotives and 303 coaches, 291 of which are accessible. As shown in Table 2-3, a total of 109 peak weekday inbound and outbound trips are scheduled, with headways ranging from 25 to 40 minutes during peak periods, and from one to four hours during off-peak times. Seventy-five double-decker cars are on order and are expected to be in service by early 1992. Over 17,600 park-and-ride spaces are provided, or are under construction, for commuter rail riders. See Commuter Parking section for a detailed breakdown.

Figure 2-4
MBTA Express Bus Routes



** Terminates at Copley Square

Table 2-2
MBTA Bus Routes and
FY 1992 Weekday Service Frequencies (in minutes)

Route #	Route Name	Rush Hours	Mid-day	Night
1	Harvard-Dudley Square via Mass Ave	7/7	12	16
3	Boston Marine Industrial Park-Chinatown	20/22	-	-
5	City Point-McCormack Housing Project	-	60	-
6	Boston Marine Ind. Park-Haymarket & South Station	30/30	30	-
7	City Point-Downtown via Northern Avenue	12/14	25	40
8	UMass-Ruggles Station via Edw. Everett Square	20	60	45
8A	Dudley Sq.-Kenmore Sta. via Longwood Medical Area	7/10	25	-
9	City Point-Copley Square via Broadway	8/9	15	30
10	City Point-Copley Square via Andrew & Southampton	25/25	35	60
11	City Point-Downtown	5/7	15	30
14	Roslindale Square-Dudley Square via Blue Hill Ave	60/60	60	60
15	Kane Square or Fields Corner-Ruggles via Uphams Corner	7/9	13	30
16	Forest Hills-UMass via Andrew	16/15	30	50
17	Fields Corner-JFK Station or Ruggles Sta. via Geneva Avenue	15/15	20	L
18	Ashmont-Broadway via Dorchester Ave	35/35	70	-
19	Fields Corner-Ruggles via Warren Street & Grove Hall	13/20	70	-
20	Fields Corner-Neponset & Adams Belt Line	12/30	30	30
21	Ashmont-Forest Hills via Morton Street	11/11	20	40
22	Ashmont-Ruggles Station via Jackson Square	6/7	13	20
23	Ashmont-Ruggles Station via Washington	5/6	13	20
24	Wakefield Avenue-Mattapan	20/25	50	60
26	Ashmont-Norfolk & Morton Belt Line	30/30	30	-
27	Mattapan-Ashmont via River Street	30/30	30	30
28	Mattapan-Ruggles Station via Dudley Square	8/8	12	20
29	Mattapan-Jackson Square Station	16/15	60	-
30	Mattapan-Roslindale Square via Cummins Highway	20/20	30	60
31	Mattapan-Forest Hills	8/8	12	20
32	Wolcott Sq.-Forest Hills via Cleary Sq./Hyde Park Ave.	12/14	15	30
32A	Cleary Sq.-Forest Hills via Hyde Park Ave.	12/14	-	-
33	Dedham Line-Mattapan via River Street	60/60	60	-
34	Dedham-Forest Hills via Washington Street	9/7	30	60
34E	Walpole Ctr.-Forest Hills via Washington Street	20/20	30	60
35	Dedham Mall/Stimson-Forest Hills via Belgrade Ave	20/12	30	L
36	Charles River-Forest Hills	11/12	30	30
37	Baker & Vermont-Forest Hills Station via Centre Street	20/13	30	-
38	Wren Street-Forest Hills Station	22/22	40	L
39	Forest Hills-Back Bay via Huntington Ave & Copley Station	3/4	7	7
40	Georgetowne-Forest Hills	30/30	50	-

Table 2-2 (Continued)
MBTA Bus Routes and
FY 1992 Weekday Service Frequencies (in minutes)

Route #	Route Name	Rush Hours	Mid-day	Night
41	Centre & Eliot Streets-Dudley via Centre Street	18/20	34	30
42	Forest Hills-Ruggles Station via Wash St. & Dudley Square	20/20	20	50
43	Ruggles Station-Park & Tremont Streets via Tremont St	8/10	15	20
44	Jackson Sq-Ruggles via Seaver St & Humboldt Ave	9/8	20	30
45	Franklin Park Zoo-Ruggles via Blue Hill Avenue	7/9	20	30
46	Heath Street & South Huntington Ave.-Dudley Square	30/30	30	-
47	Central Sq, Cambridge-Boston City Hosp. via Dudley Square	20/20	20	30
48	Centre & Eliot Sts./J. P. Loop via Jackson Sq./Green St.	-/-	30	-
49	Dudley Square-Downtown	6/6	11	13
50	Cleary Square-Forest Hills via Roslindale Square	20/20	60	-
51	Cleveland Circle-Forest Hills via Hancock Village	20/20	60	60
52	Dedham Mall/Charles River-Watertown Square via Oak Hill	30/30	45	-
53	Roberts-Newton Corner via Central Square, Waltham	30/60	60	-
54	Waverly Sq.-Newton Corner via Waltham Center	30/60	60	-
55	Queensberry-Copley Sq./Park & Tremont Sts. via Ipswich	17/30	60	30
56	Waltham Highlands-Newton Corner via Waltham Center	30/30	60	-
57	Watertown Square-Kenmore via Brighton Center	6/6	9	15
58	Auburndale-Newton Corner via Waltham Center	30/30	60	-
59	Needham Junction-Watertown Square via Newtonville	30/30	40	-
60	Chestnut Hill-Kenmore via Brookline Village	17/18	28	45
62	Bedford VA Hospital-Alewife via Lexington Center	30/30	60	L
64	Oak Square-Central Square, Cambridge	18/18	30	60
65	Brighton Center-Kenmore via Brookline Village	20/25	30	-
66	Harvard Square,-Dudley Square via Brookline Village	10/10	15	25
67	Alewife -Alewife via Turkey Hill Reservation	25/25	45	-
69	Harvard-Lechmere via Cambridge Street	14/17	22	30
70	Cedarwood-Central Square, Cambridge via Watertown Sq.	15/15	30	60
70A	North Waltham-Central Square, Cambridge	45/45	120	-
71	Watertown Square-Harvard via Mt. Auburn Street	7/8	12	30
72	Huron Avenue-Harvard via Concord Avenue	15/15	30	30
73	Waverley Square-Harvard via Trapelo Road	4/4	12	30
74	Belmont Center-Harvard via Concord Avenue	14/15	30	60
76	Hanscom AFB-Alewife via Lexington Center	30/30	60	60
77	Arlington Heights-Harvard Station via Mass Ave	6/6	11	12
77A	North Cambridge-Harvard Station Local	9/9	12	-
78	Arlmont-Harvard Station via Blanchard Road	14/15	30	60
79	Arlington Heights-Alewife via Mass Ave	8/9	25	45
80	Arlington Center-Lechmere via Medford Hillside	15/15	35	60

Table 2-2 (Continued)
MBTA Bus Routes and
FY 1992 Weekday Service Frequencies (in minutes)

Route #	Route Name	Rush Hours	Mid-day	Night
83	Rindge Ave.-Central Square, Cambridge via Porter	8/15	30	60
84	Arlmont Loop-Alewife	30/17	-	-
85	Spring Hill-Kendall via Union Square, Somerville	30/40	40	-
86	Sullivan-Cleveland Circle via Harvard Square	20/20	30	60
87	Arlington Center-Lechmere via Clarendon Hill	16/15	30	30
88	Clarendon Hill-Lechmere via Highland Avenue	7/12	30	30
89	Clarendon Hill-Sullivan via Broadway	9/10	30	60
90	Davis Square-Wellington via Sullivan & Assembly Sq Mall	30/35	70	60
91	Sullivan-Central Square, Cambridge via Washington St	25/25	25	60
92	Assembly Square Mall-Downtown via Sullivan & Haymarket	10/13	30	L
93	Sullivan-Downtown via Bunker Hill Street & Haymarket	6/7	20	30
94	Medford Square-Davis via West Medford	22/20	40	40
95	West Medford-Sullivan via Mystic Avenue	15/15	30	60
96	Medford Square-Harvard via Davis	20/20	40	60
97	Malden-Wellington via Commercial and Hancock Streets	30/30	60	-
99	Upper Highland Avenue-Wellington via Main Street	20/20	30	60
100	Elm Street-Wellington via Fellsway	20/20	20	60
101	Malden Station-Sullivan via Salem St, Main St, & Broadway	15/12	30	60
104	Malden Station-Sullivan via Ferry Street	12/15	30	60
105	Malden Station-Sullivan via Faulkner & Main Streets	30/30	60	-
106	Lebanon Street, Malden-Wellington via Main Street	20/20	30	60
108	Linden Square-Wellington via Malden St & Highland Ave	20/25	30	60
109	Linden Square-Sullivan Square via Broadway	12/15	30	60
110	Wonderland or Broadway/Park-Wellington via Park Ave	20/20	30	60
111	Woodlawn-Haymarket via Mystic Bridge & Tobin Bridge	6/8	15	15
112	Wellington-Maverick via Central Ave & Mystic Mall	35/35	35	-
116	Wonderland-Maverick via Revere Street	17/20	30	60
117	Wonderland-Maverick via Beach Street	17/20	30	60
119	Northgate-Beachmont via Revere Center	30/30	60	40
120	Orient Heights-Maverick via Bennington Street	13/15	20	60
121	Wood Island-Maverick via Lexington Street	30/25	-	-
130	Lebanon Street, Melrose-Malden Station via Forestdale	30/30	60	-
131	Melrose Highland-Malden Station via Oak Grove Station	30/30	60	-
134	North Woburn-Wellington via Medford Square	60/60	60	-
134M	Medford Square-Wellington Station	40/20	60	-
136	Reading Square-Malden Station via Lakeside & Oak Grove	30/45	70	L
137	Reading Square-Malden Station via North St & Oak Grove	30/30	70	80

Table 2-2 (Continued)
MBTA Bus Routes and
FY 1992 Weekday Service Frequencies (in minutes)

Route #	Route Name	Rush Hours	Mid-day	Night	
210	Quincy Center-Fields Corner via North Quincy	30/30	30	-	
211	Quincy Center-Squantum via North Quincy	L/30	60	-	
212	Quincy Center-North Quincy via Billings Road	30/60	-	-	
214	Quincy Center-Germantown via Sea Street & Oceanview	12/20	30	-	
215	Quincy Center-Ashmont via East Milton Square	20/30	30	60	
216	Quincy Center-Houghs Neck via Sea Street	9/20	30	60	
217	Wollaston Beach-Ashmont via Wollaston	30/30	60	-	
220	Quincy Center-Hingham	10/10	60	60	
221	Fort Point-Quincy Center	L/L	-	-	
222	Quincy Center-East Weymouth	11/15	30	60	
225	Quincy Center-Weymouth Landing via Des Moines Road	20/20	60	60	
225A	Quincy Center-Weymouth Landing via Quincy Avenue	20/20	60	-	
230	Quincy Cntr-Brockton Line via Holbrook & Braintree Sta.	20/20	60	60	
236	Quincy Center-South Shore Plaza via Braintree Station	L/30	60	-	
238	Quincy Center-Crawford Sq., Randolph via Quincy Adams	30/30	60	60	
240	Avon-Ashmont via Randolph	20/20	60	60	
240A	Crawford Square-Ashmont	20/20	60	-	
245	Quincy Center-Mattapan via Quincy Hospital	30/30	60	-	
300	Riverside-Downtown Express via Mass Pike	7/6	-	L	X
301	Brighton Center-Downtown Express via Oak Sq & Mass Pike	4/5	-	-	X
302	Watertown Square-Copley Square Express via Mass Pike	10/12	-	-	X
304	Watertown Square-Downtown Express via Mass Pike	8/10	30	-	X
304A	Newton Corner-Downtown Express via Mass Pike	8/10	30	-	X
305	Waltham Center-Downtown Express via Mass Pike	6/8	-	-	X
325	Elm Street, Medford-Haymarket Express via I-93	10/12	-	-	X
326	West Medford-Haymarket Express via I-93	10/12	-	-	X
350	Burlington/Billerica Line-Alewife via Arlington Center	14/20	60	60	
352	Burlington-Haymarket or Park Square Express via 128 & I-93	10/15	-	-	X
353	Burlington Industrial Area-Haymarket via Woburn Center	30/25	-	-	X
354	Woburn Center-Haymarket or Park Square Express via I-93	10/15	-	-	X
400	Lynn-Haymarket via Lynn Common	15/15	30	60	X
411	Malden Station-Revere House via Granada Highlands	35/50	60	-	
426	Lynn & East Saugus-Haymarket Express via Cliftondale	15/15	60	80	X
429	Central Square, Lynn-North Saugus	30/30	60	-	
430	Appleton St, Saugus-Malden Station via Saugus Center	40/45	60	-	
433	Pine Hill-Central Square, Lynn	40/40	L	-	
435	Lynn-Danvers via NS Shopping Center & Liberty Tree Mall	L/L	60	-	

Table 2-2 (Continued)
MBTA Bus Routes and
FY 1992 Weekday Service Frequencies (in minutes)

Route #	Route Name	Rush Hours	Mid-day	Night	
436	Happy Valley-Central Square, Lynn	30/30	60	-	
437	Lake Shore-Central Sq. Lynn via Eastern Ave & Lake Side	30/30	60	-	
439	Central Square, Lynn-Nahant	30/30	L	-	
440	Lynn-Haymarket via Lynnway & General Edwards Bridge	15/10	30	60	X
441	Marblehead-Downtown via Paradise Rd & Central Sq, Lynn	30	60	-	X
442	Marblehead-Downtown via Humphrey St & Central Sq, Lynn	30	60	60	X
450	Salem-Haymarket via Highland & Western Avenue	10	60	L	X
451	North Beverly-Salem	60	60	-	
455	Salem-Haymarket via Central Square, Lynn	30	30	60	X
458/ 468	Salem Center-Danvers via Liberty Tree Mall & Endicott Plaza	60	60	-	

L=Limited Service

X=Express Bus Route

Figure 2-5
MBTA Commuter Rail Lines

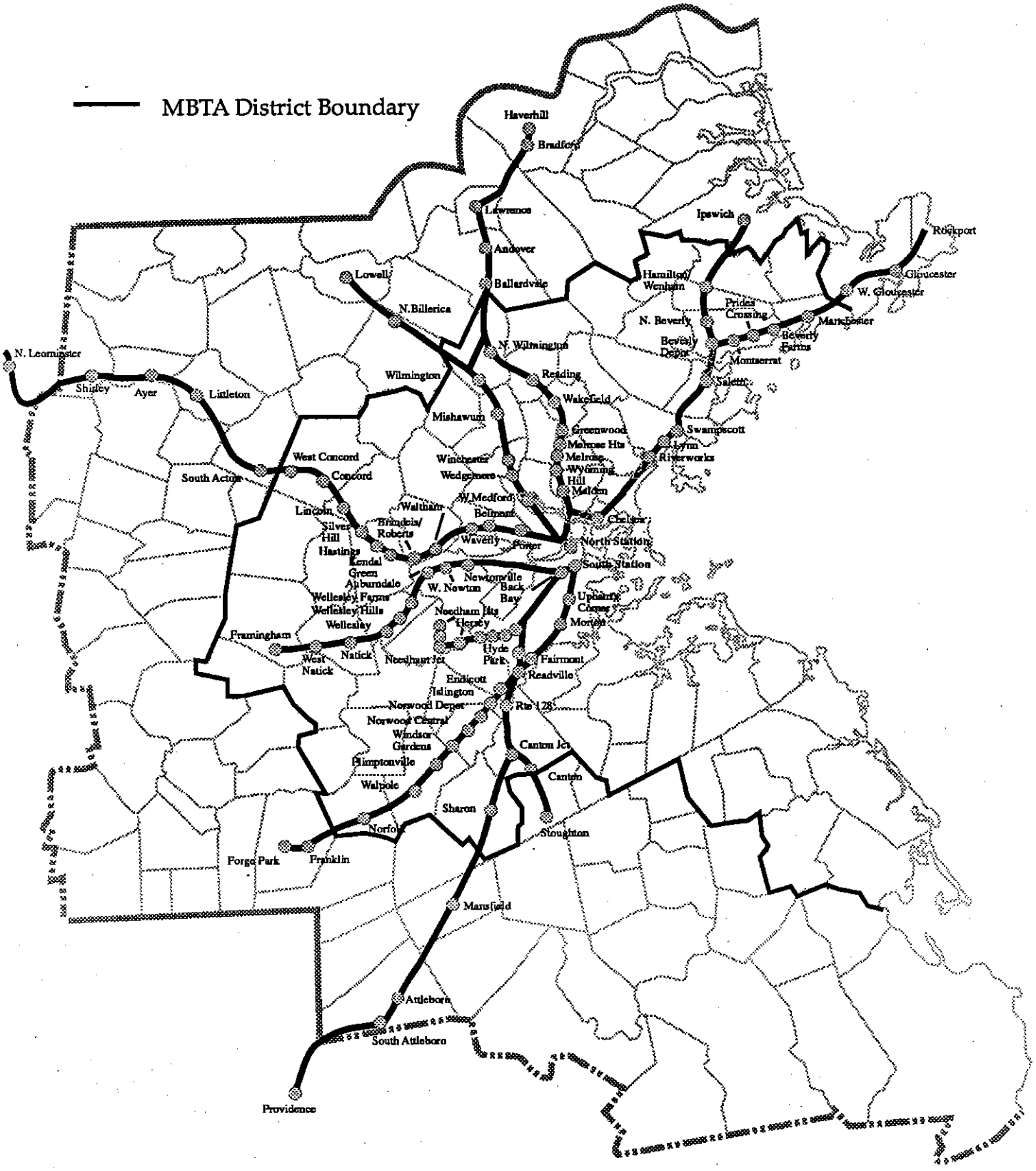


Table 2-3
FY 1992 Commuter Rail Service Levels

	Weekday Trips In	Weekday Trips Out	Weekday Trips Headways	Saturday Trips	Sunday Trips
NORTH SIDE SERVICE					
Fitchburg Line					
Peak	5	5	40 minutes	-	-
Off Peak	11	11	2 hours	-	-
Total	16	16		16	14
Lowell Line					
Peak	5	5	30 minutes	-	-
Off Peak	17	17	1 hour	-	-
Total	22	22		16	16
Haverhill Line					
Peak	7	6	25 minutes	-	-
Off Peak	15	16	2-3 hours	-	-
Total	22	22		12	12
Ipswich Line					
Peak	4	3	30 minutes	-	-
Off Peak	8	9	2 hours	-	-
Total	12	12		10	-
Rockport Line					
Peak	3	4	30 minutes	-	-
Off Peak	9	8	2 hours	-	-
Total	12	12		14	14
NORTH SIDE TOTALS					
Peak	24	23	25-40 minutes	-	-
Off Peak	60	61	1-3 hours	-	-
Total	84	84		68	56

(continued)

Table 2-3 (Continued)
FY 1992 Commuter Rail Service Levels

	Weekday Trips In	Weekday Trips Out	Weekday Trips Headways	Saturday Trips	Sunday Trips
SOUTH SIDE SERVICE					
Framingham Line					
Peak	4	5	30 minutes	-	-
Off Peak	10	10	2 hours	-	-
Total	14	15		-	-
Needham Line					
Peak	5	5	30 minutes	-	-
Off Peak	12	12	2 hours	-	-
Total	17	17		16	-
Franklin Line					
Peak	6	5	30 minutes	-	-
Off Peak	12	12	2 hour	-	-
Total	18	17		10	-
Attleboro Line					
Peak	6	5	25 minutes	-	-
Off Peak	10	11	2-3 hours	-	-
Total	16	16		12	-
Stoughton Line					
Peak	4	5	30 minutes	-	-
Off Peak	13	12	1 hour	-	-
Total	17	17		4	
Fairmount Line					
Peak	6	6	30 minutes	-	-
Off Peak	17	15	2 hours	-	-
Total	23	21		14	-
SOUTH SIDE TOTALS					
Peak	31	31	25-40 minutes	-	-
Off Peak	74	72	1-3 hours	-	-
Total	105	103		38	-
NORTH & SOUTH SIDE TOTALS					
Peak	55	54	25-40 minutes	-	-
Off Peak	134	133	1-3 hours	-	-
Total	189	187		106	56

COMMUTER BOAT

Commuter boat service operates between Hingham and Rowe's Wharf (Boston), the Charlestown Navy Yard and Long Wharf (Boston), and from Point Pemberton in Hull.

The majority of service between Hingham and Boston is operated by Boston Harbor Commuter Service using five vessels: two with a capacity of 320 passengers, and three with a capacity of 150 passengers. Operating between 6:00 a.m. and 8:00 p.m., 17 inbound trips and 17 outbound trips, with peak period frequency every 15 to 20 minutes, are made per day. Average daily ridership, in FY 1991 approximated 2,200 trips. A second operator, Mass Bay Lines provides unsubsidized service along the same route. Approximately 1,350 parking spaces are provided among several lots at the Hingham Shipyard.

Ferry service from the Charlestown Navy Yard to Long Wharf is operated by Boston Harbor Cruises with funding provided by the Massachusetts Highway Department. Two 38-passenger vessels handle approximately 611 passenger trips per weekday. Also at the Navy Yard, Reliable Bus Lines operates shuttle bus service with connections to the ferry.

Other private commuter boat service between the South Shore and Boston is provided by Bay State Cruises, from Point Pemberton in Hull. Bay State Cruises operates one inbound and one outbound trip per day. A separate boat service, operated by Nantransit from Nantasket Pier in Hull, was recently suspended.

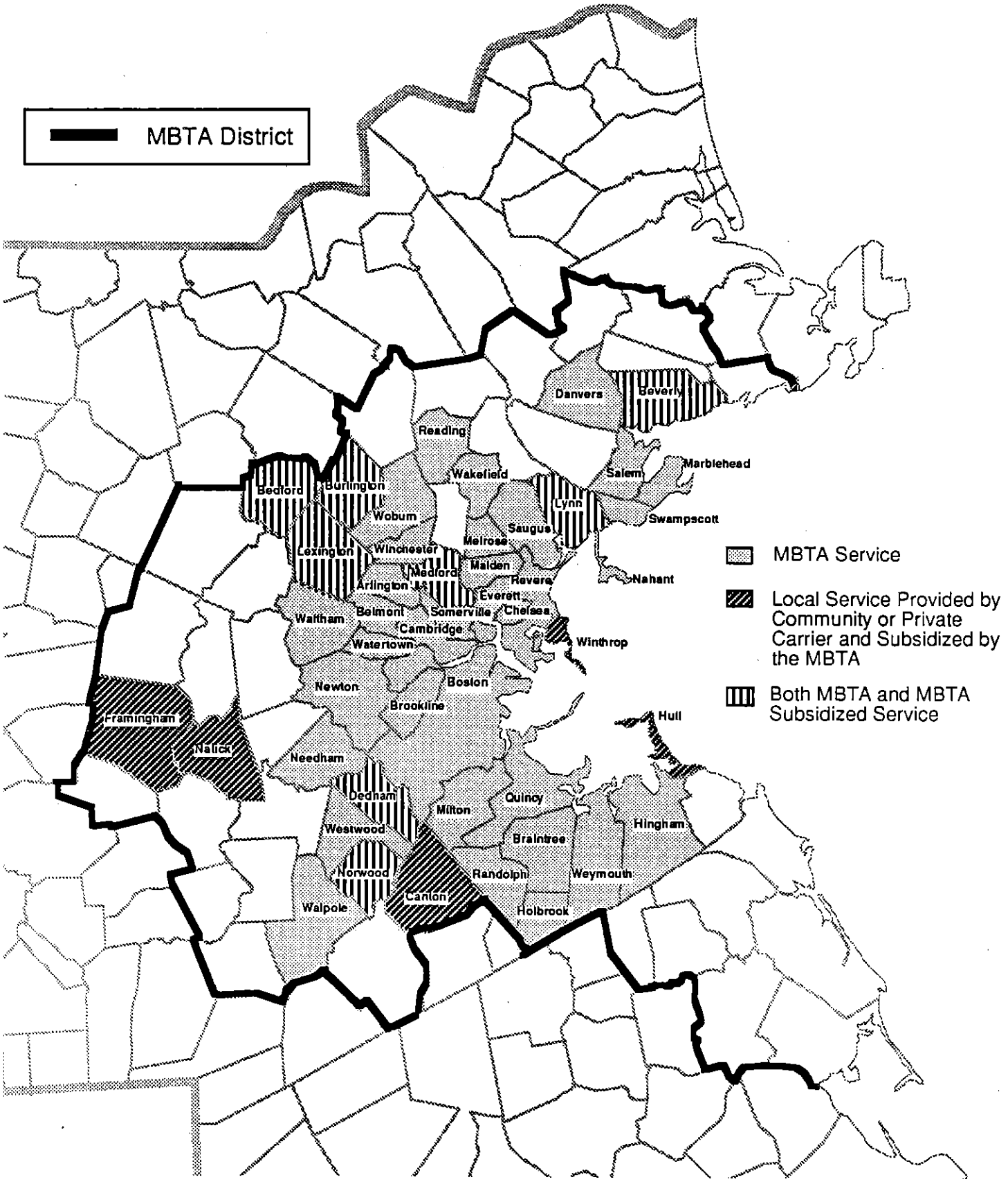
SUBURBAN BUS

The suburban bus program is geared toward low density communities where regular MBTA service would not be cost-effective. Through this program, the MBTA provides funding and technical assistance to suburban communities that operate local transit services. The program, begun in 1979, subsidizes 10 communities: Bedford, Beverly, Burlington, Dedham, Framingham, Lexington, Lynn, the Mission Hill neighborhood of Boston, Natick and Norwood. Service in Needham has been temporarily suspended. Average weekday ridership in FY 1991 totaled 1,875 trips. Table 2-4 summarizes the MBTA Suburban Bus Program, and Figure 2-6 shows communities served by MBTA subsidized local bus service, as well as MBTA bus routes.

Table 2-4
FY 1992 Suburban Bus Service

Bedford	Lynn
•Local fixed route & demand response service •Shoppers service •One 12 passenger van	•Intra-town fixed route service shoppers service •One full size bus
Beverly	**Mission Hill**
•Local fixed route •Business district shoppers service •One 25 passenger bus	•Local fixed route service •Commuter link to MBTA Orange & Green Lines •Medical area service •One mini-bus
Burlington	**Natick**
•Local fixed route service •Commuter link to MBTA bus service at Burlington Mall •Shoppers service •Three mini-buses	•Intra-town fixed route and demand response service •Commuter link to MBTA commuter rail service & Peter Pan Bus Service •Commuter bus & Framingham Shoppers World Mall •Shoppers service •Two mini-buses
Dedham	**Norwood**
•Local fixed route service •Commuter link to MBTA bus service at Dedham Mall •Shoppers service •One full size bus	•Elderly & handicapped transport service •Intra-town demand response service •Taxi cabs & handicapped accessible vans
Framingham	**Lexington**
•Intra-town fixed route service •Commuter link to MBTA bus, commuter rail & Natick Suburban •Bus service at Shoppers World Mall •One full size bus & three mini-buses	•Intra-town fixed route service •Shoppers service •Four mini-buses

Figure 2-6
Communities with Local Bus Service



PRIVATE CARRIER BUS SERVICE

A total of 20 private bus carriers provide commuter service on 34 routes within the PMT study area of 164 communities, the majority of which are radial trips to downtown Boston. These carriers provide fixed route service to communities that, for the most part, are not directly served by MBTA bus or rail.

Operators providing Boston-bound service with boardings within the PMT study area are as follows (see also Figure 2-7):

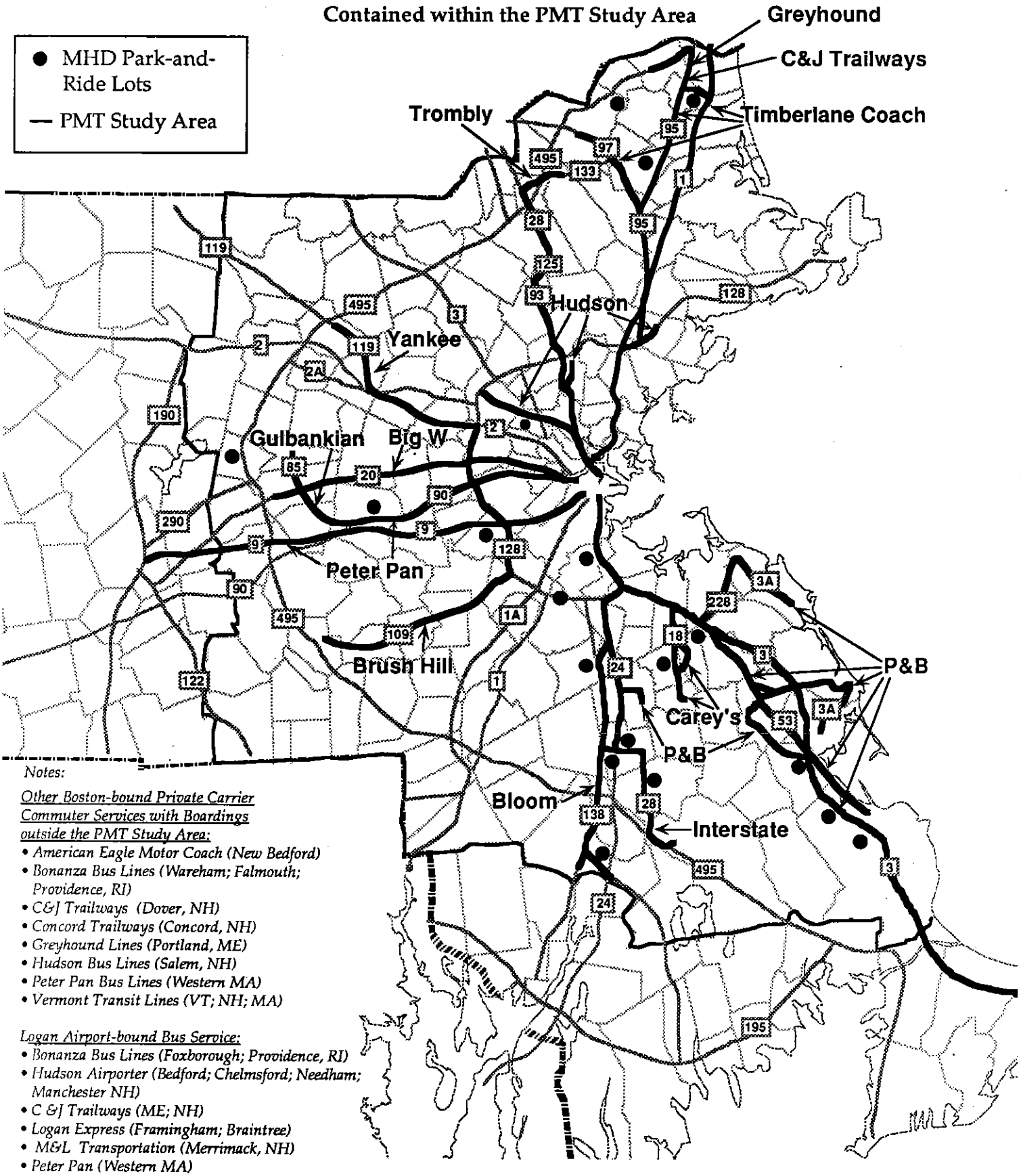
- Big W Trans, Inc. (from Northborough) *
- Bloom Bus Lines (from Taunton) *
- Brush Hill Transportation (from Milford) *
- Carey Bus Lines (from Whitman) *
- C&J Trailways (from Durham, NH, via Newburyport)
- Gulbankian's Bus Lines (from Hudson)
- Greyhound Lines (from Portland, ME via Newburyport)
- Hudson Bus Lines (from Peabody; Lexington; Stoneham)
- Interstate Coach (from Middleborough) *
- Peter Pan Bus Lines (from Westborough; Framingham; Worcester*)
- Plymouth & Brockton Street Railway Co. (from Brockton*; Plymouth Center*; Scituate; Pembroke Center; S. Duxbury; Hyannis* (serving Plymouth).
- Timberlane Coach (from Amesbury; Newburyport; Haverhill) *
- Trombly Commuter Lines (from North Andover) *
- Yankee Line (from Littleton)

Operators providing inter-suburban and other services, within the study area, are as follows:

- Andre Coachlines (between Hull and Hingham) *
- Hudson Bus Lines (between Canton and Mattapan; in Medford: Fulton Street to Meadow Glen Mall) *
- Town of Framingham/Big W (between Hopkinton and Framingham; between Milford and Framingham) *
- Michaud Bus Lines (between Peabody and Salem) *
- Paul Revere Transportation (between Winthrop and East Boston) *
- Plymouth & Brockton Street Railway Co (between Marshfield and Braintree) *
- Reliable Bus Lines (Charlestown Navy Yard) *

* *Service subsidized by the state.*

Figure 2-7
Boston-Bound Private Carrier Bus Services
Contained within the PMT Study Area



Notes:

Other Boston-bound Private Carrier Commuter Services with Boardings outside the PMT Study Area:

- *American Eagle Motor Coach (New Bedford)*
- *Bonanza Bus Lines (Wareham; Falmouth; Providence, RI)*
- *C&J Trailways (Dover, NH)*
- *Concord Trailways (Concord, NH)*
- *Greyhound Lines (Portland, ME)*
- *Hudson Bus Lines (Salem, NH)*
- *Peter Pan Bus Lines (Western MA)*
- *Vermont Transit Lines (VT; NH; MA)*

Logan Airport-bound Bus Service:

- *Bonanza Bus Lines (Foxborough; Providence, RI)*
- *Hudson Airporter (Bedford; Chelmsford; Needham; Manchester NH)*
- *C &J Trailways (ME; NH)*
- *Logan Express (Framingham; Braintree)*
- *M&L Transportation (Merrimack, NH)*
- *Peter Pan (Western MA)*

In FY 1991, daily ridership on those state subsidized routes listed above averaged 6,000 trips. Other subsidized bus service serving communities outside the study area include American Eagle Motor Coach (from New Bedford to Boston, Express) and Wilson Bus Lines (between Gardner and Fitchburg).

CARAVAN SERVICE

CARAVAN for Commuters, Inc., Massachusetts' private non-profit commuter services company, provides comprehensive transportation services to commuters and their employers which facilitate transit and shared ride transportation alternatives to drive alone commuting. CARAVAN serves a client base of close to 1,000 corporations to create transportation programs for employers, developers, and communities.

In addition, it works with public and private decision-makers forming Transportation Management Associations (TMAs) to improve commuter mobility on an areawide basis. TMAs already formed include the Route 128 Transportation Council (Waltham area), CommuteWorks (Longwood Medical Area, Boston), the Back Bay TMA, and the Interinstitutional TMA (South End Medical Area, Boston). Those currently in the formation stages include the North Suburban TMA (Route 128 between routes 2A and 129), the 495 West TMA (Route 9, Marlborough) and the MetroWest TMA (Framingham and Natick).

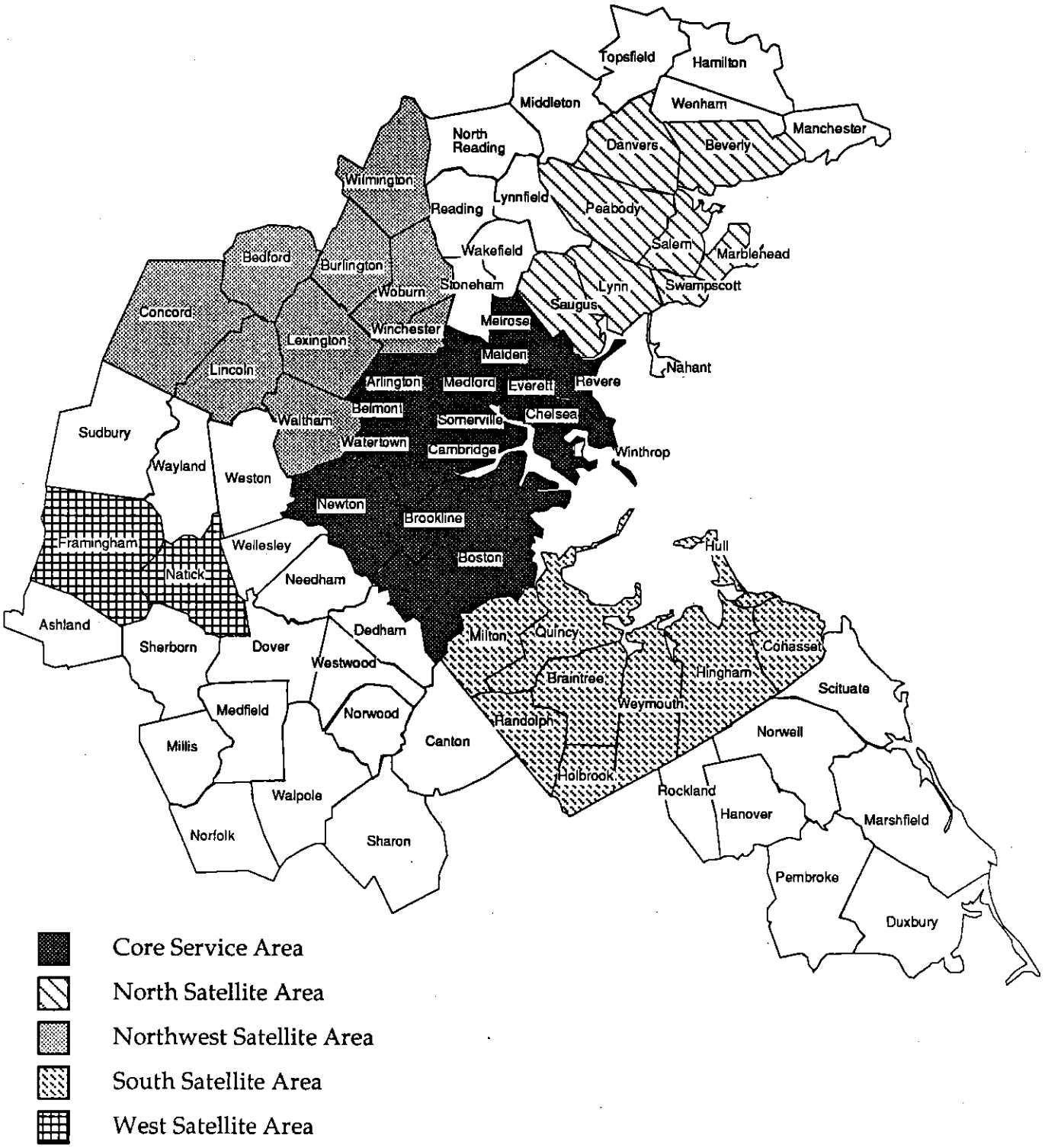
CARAVAN also forms vanpools, recruits riders, and administers company-sponsored, owner-operator, and multi-vendor vanpool programs. Current ridership on 215 vans totals 6,020 trips per day, with an average daily round trip mileage of 85 miles. For commuters without access to transportation services at the work site, CARAVAN provides commute planning assistance directly with its statewide commuter information line.

PARATRANSIT

The MBTA provides three specialized accessible service programs: The RIDE, wheelchair-lift bus routes, and Call-a-Lift Bus. In addition, there are a number of accessible services operated by cities and towns, Councils on Aging, and charitable operations.

The RIDE service is a paratransit program that provides transportation to people who cannot use general public transportation because of disabilities. The RIDE operates lift equipped vans in 44 communities within the MBTA district, a service area that exceeds 486 square miles organized into five separate geographic areas (see Figure 2-8). In FY 1991, approximately 1,100

Figure 2-8
The RIDE Service Area



trips are made on The RIDE each day. The Wheelchair-Lift program provides only lift-equipped buses on certain regularly scheduled bus routes. These routes are called "Lift Bus Routes" and are identified on schedule cards with the international symbol for accessibility. The Call-a-Lift Bus program provides lift-equipped buses upon request on routes where no scheduled buses are wheelchair lift equipped (except trackless trolleys).

Overall, The RIDE program consists of a fleet of 221 vehicles, 116 of which are owned by the MBTA. There are currently seven contractors providing service to over 17,000 registered RIDE customers: DAVE Transportation Services, Veterans Transportation Services and Kit Clark Senior House in the Core area; Share-A-Ride in the Northwest area; Thomson Transit in the West; Kiessling School Transportation in the South area; and North Shore Transit in the North area. The one-way fare on The RIDE is one dollar.

Expansion of The RIDE is planned to Dedham, Norwood, Walpole, Westwood, Reading, Wakefield and Needham by spring 1993; to Canton, Sharon, Stoneham and Lynnfield by 1994; to Middleton, Wellesley, Weston and Wenham by 1995; and to Topsfield, Dover and Medfield by 1996.

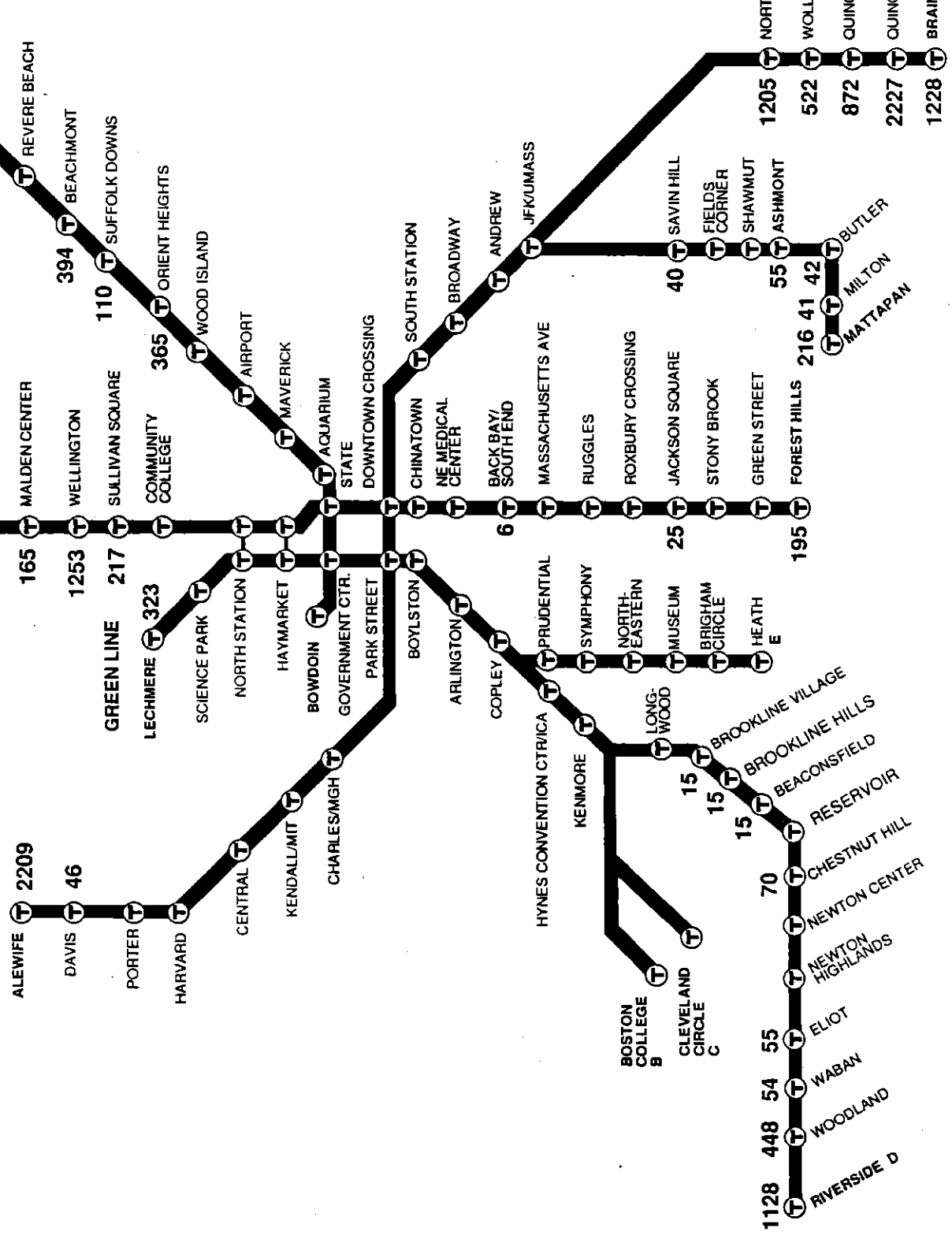
Other entities offering paratransit services to the elderly and disabled are the Boston Senior Commission on Affairs of the Elderly (Boston), Busy Bee Transportation (Greater Framingham), Federated Dorchester Neighborhood Houses, Inc. (Dorchester/Mattapan/South Boston), Greater Lynn Senior Services (North Shore), Marblehead Council on Aging , Middleton Council on Aging, North Shore Transit, Inc., Peabody Council on Aging, Salem Council on Aging, Share-A-Ride, Inc. (17 communities North and West of Boston), South Shore Community Action Council, Inc., Southwest Boston Senior Services, Tommy's Taxi, Inc. (Greater Framingham, and Veterans Taxi (Newton/Needham, Wellesley/Weston).

COMMUTER PARKING

The MBTA and the Massachusetts Highway Department (MHD) provide 152 park-and-ride facilities for commuter rail, rapid transit, bus, boat and carpooling trip-making. A grand total of nearly 39,000[6] parking spaces are provided regionwide, of which approximately 3,700 are provided by the MHD for bus and/or carpooling trips at 22 lots. Spider maps of rapid transit and commuter rail indicating park-and-ride supplies by station are presented in Figure 2-9 and Figure 2-10. MHD parking lots are shown together with private carrier routes in Figure 2-7.

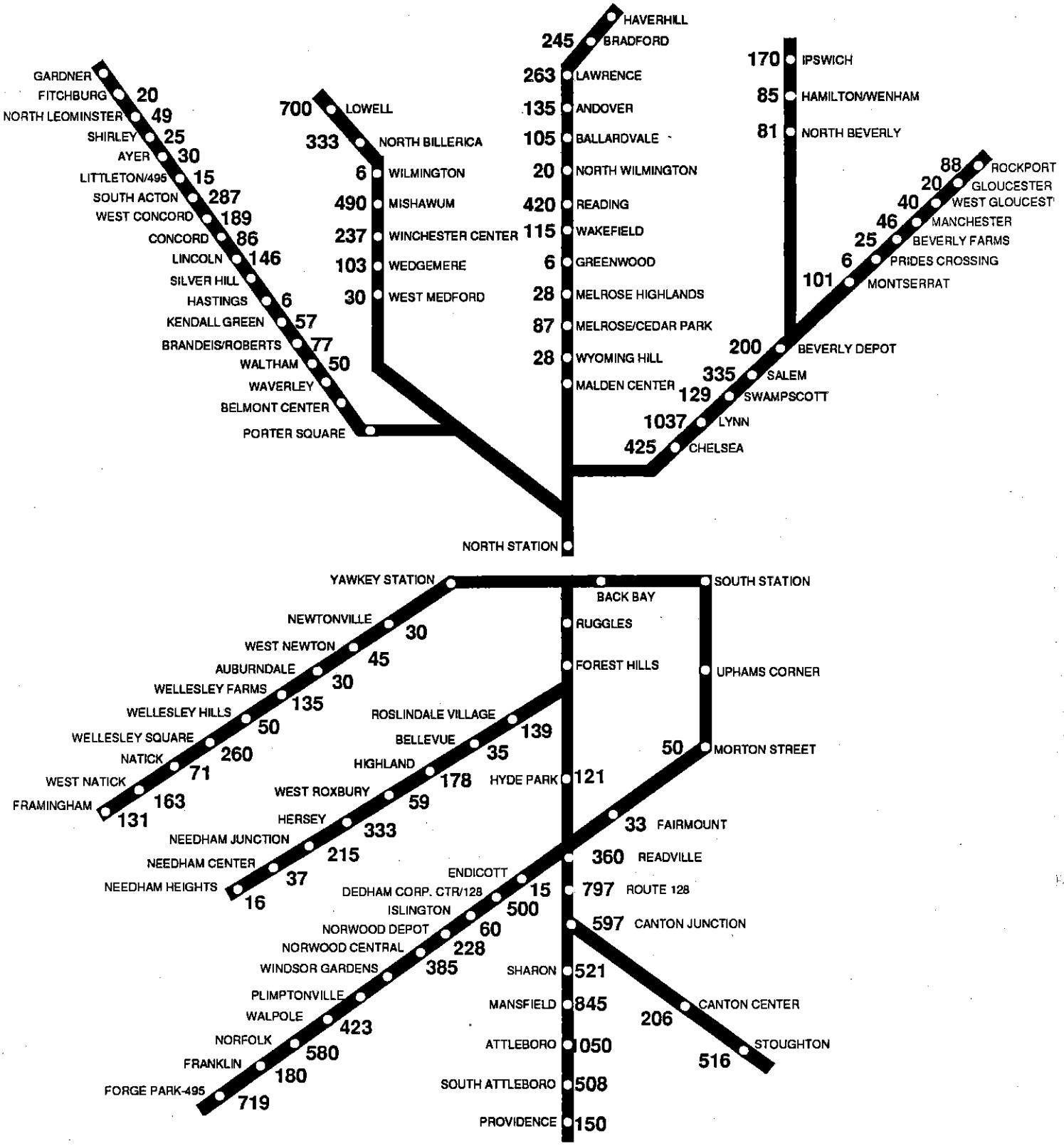
[6]Total park-and ride spaces by mode: Rapid Transit, 15,789; Commuter Rail, 17,947; Bus, 194; Boat, 1,350. MHD provided spaces, 3,712

Figure 2-9
Rapid Transit Park-and-Ride Facility Capacity, by Station



Commuting in a New Century: Phase 2 PMT Report

Figure 2-10
Commuter Rail Park-and-Ride Facility Capacity, by Station



COMMUTER BICYCLE FACILITIES

For the most part, bicyclists travel on ordinary streets and highways shared with motor traffic; bicycles may use all public ways except for limited access and express highways where prohibitions have been posted. Present conditions for bicycling vary widely due to differences in roadway width and other design considerations, as well as traffic volume. In addition there are several special facilities and programs directed toward bicyclists:

Bicycle Paths The Boston metropolitan area is served by a number of bike and bicycle/pedestrian paths that were designed by the Metropolitan District Commission (MDC), the City of Boston and the MBTA. Most are now maintained by the MDC. The longest bicycle paths are the Charles River (Paul Dudley White) Bike Paths, which form a 14-mile loop from Watertown to Cambridge and Boston, and the 4.7-mile Southwest Corridor Linear Park Path, which parallels the MBTA's Orange Line from Forest Hills to the South End. An 11-mile bicycle/pedestrian path from Bedford to Arlington is currently under construction. Known as the Minuteman Commuter Bikeway, this path will provide access to Alewife Station.

Bikes on the T Program This program was established by the MBTA in 1985 and expanded in 1989. It allows bicyclists to purchase a four-year pass to carry a bicycle on all commuter rail and rapid transit lines except the Green Line. Hours on the rapid transit lines are limited to weekends and weeknights after 8:00 pm. The commuter rail lines permit bicycles on all weekend trains and during nonpeak hours on weekdays (outbound until 3:00 pm and inbound from 9:30 am to 6:30 pm).

Bicycle Parking at Transit Stations Bicycle racks have been installed at both rapid transit and commuter rail stations throughout the MBTA system. As of April 1991, racks had been installed at more than 50 percent of the Red Line and Orange Line stops, 35 percent of the Green Line stops, 25 percent of the Blue Line stops, and 32 percent of commuter rail stations. The MBTA has also conducted a preliminary test of bicycle lockers at Wollaston Station on the Red Line.

Bicycle Commuting by Boat Three commuter boat carriers, i.e. Boston Harbor Commuter Service, Mass. Bay Lines and Bay State Cruises operating service between the South Shore and downtown Boston, accept bicycles on a space-available basis at no extra charge.

Logan Airport Bicycle Access Since 1989, Massport has provided a taped message for bicyclists as part of its 1-800-23-LOGAN information program. Bicycles are permitted on both airport shuttle buses and the Logan Express buses from Framingham and Braintree. Parking is available at the Maverick Station gate area.

SYSTEM CAPACITY AND USAGE

Between 1983 and 1990, average daily ridership on the basic system, (i.e. rapid transit, light rail, local bus and express bus) and commuter rail increased 27 percent from 788,500 trips to 940,900[7]. By mode, the basic system and other services grew at an annual rate of 2.5 percent per year and commuter rail grew at 10 percent. Extrapolating this growth rate through to the year 2000, ridership would top 1.3 million daily trips. Achieving this ridership level will require major increases in the capacity of the existing system, the construction of new rail line(s) and service to new ridership markets.

In FY 1991, conditions on the Red, Orange, Blue and Green lines indicate an average volume to capacity (V/C) of 83% in the peak hour and peak direction. Given planned improvements which include new equipment purchases and capital projects, it is estimated that peak hour rapid transit capacity will increase by 33% to almost 52,000 passengers per hour. On commuter rail, the capacity of all lines during the peak hour was 18,150. Corresponding peak hour ridership totaled 17,449 persons in May 1990 - a volume to capacity of 96%. At present, it is estimated that the total capacity of the existing system is roughly 1 million daily trips.[8]

By the year 2000, restoration of Green Line service to Arborway, expanded Red Line (86 new cars), Orange Line (46 new cars) and Blue Line (28 new cars) fleets, Washington Street replacement service and an expanded commuter rail fleet (126 new cars including 75 double-decker coaches) will add 33,000 seats to the system capacity. These capital purchases will enable all modes to run at more frequent headways during the peak hour. New commuter rail coaches will allow a 50% increase in service. To support higher ridership levels, approximately 20,000 additional park-and-ride spaces are planned on the rapid transit and commuter rail systems.

A recent analysis, based on currently proposed additions to the system and ridership trends based on population and employment forecasts, indicated that, if capacity constraints were removed, the system would be expected to generate a volume of 1.15 million daily trips. Under this scenario however, volume would still exceed capacity by 150,000 daily trips.

---

[7] All trips are reported in unlinked trips.

[8] This calculation is based on current service levels as determined by existing vehicle fleet and frequency of service during the peak and non-peak hours. Given current operational characteristics, roughly 50,000 additional trips, over the course of the day, could be made without constraining the system.

Chapter 3
Progress Since the Last Program for Mass Transportation

STATUS OF PROJECTS FROM THE 1978 PMT

The 1978 Program for Mass Transportation contained two categories of capital improvements, one for plant and vehicle improvements and the other for service expansion. The first category covered such items as electric power sources for the system, track renovations, improvements in the signaling system and communications, maintenance and storage facilities, bus and rapid transit vehicles, station modernization, parking capacity expansion, and accessibility improvement projects. The chapter on new service projects listed fifteen proposals, including improvements to all of the transit lines and three new routes.

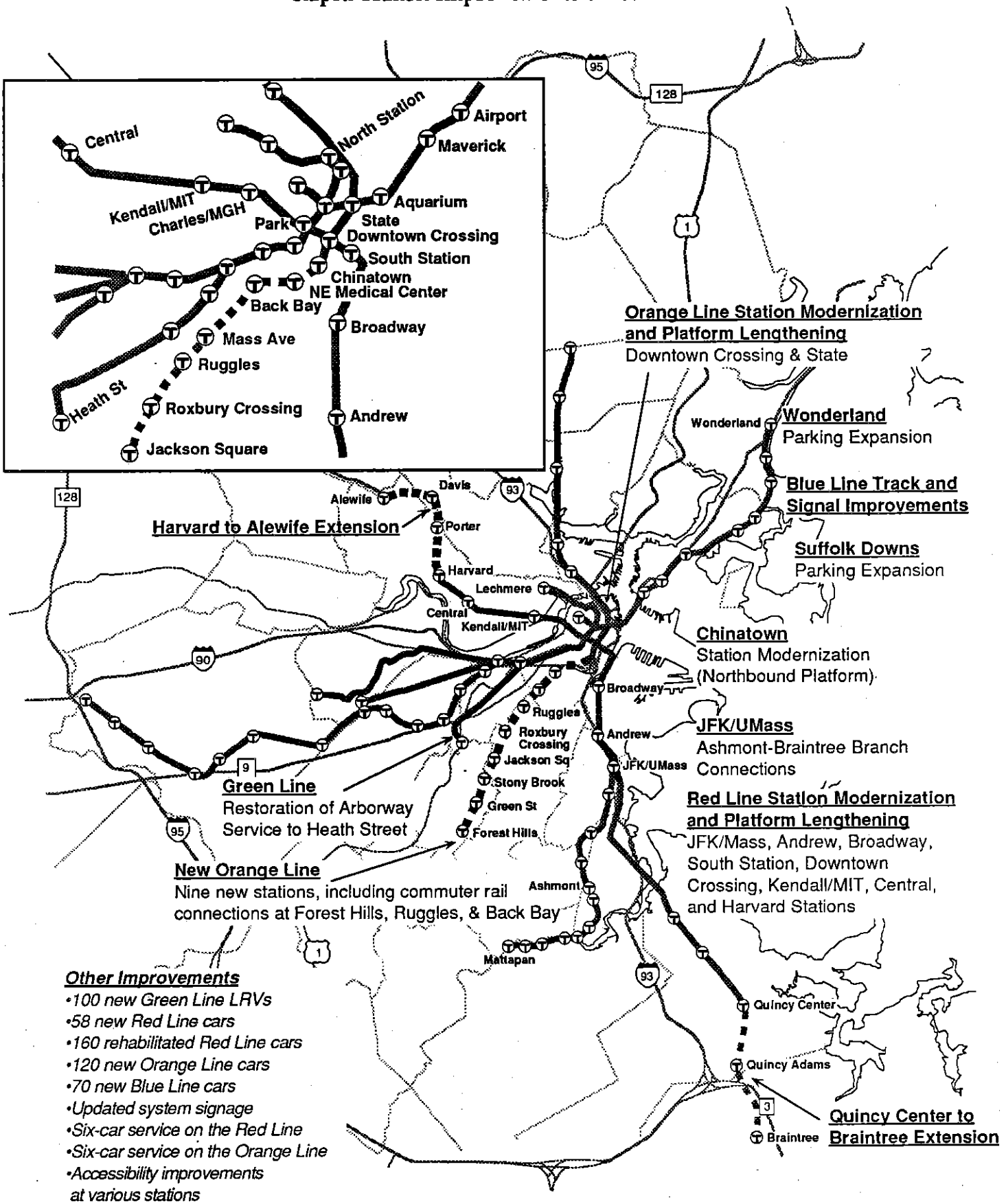
Since 1978, much of the capital program has been implemented. These improvements are discussed below, presented by mode and also organized by transportation corridor. Following this section is a status report on the PMT projects which have not been implemented to date.

RAPID TRANSIT AND LIGHT RAIL

Systemwide improvements to rapid transit and light rail have included investment in existing infrastructure, improvements to vent shafts, tunnels, signaling systems, emergency exits and electrification. Line specific improvements over the past 12 years have increased capacity and ridership. These improvements are shown in Figure 3-1.

Red Line Improvements to the Red Line include an extension of service from Harvard Station to Alewife in North Cambridge, with station stops at Porter Square in Cambridge and Davis Square in

Figure 3-1
Rapid Transit Improvements Since 1978



Somerville. At Alewife, a parking facility providing 2,209 spaces was constructed. In addition, the following stations were modernized and/or had their platforms lengthened: Harvard, Central, Kendall/MIT, Charles/MGH, Park Street, Downtown Crossing, South Station, Broadway, Andrew (construction in progress) and JFK/UMass. Also, a connection between the Ashmont and Braintree branches was built at JFK/UMass, and Red Line service was extended from Quincy Center to Quincy Adams and Braintree, providing 2,227 and 1,228 parking spaces respectively. A total of 58 new Red Line cars were purchased allowing for the operation of six car trains. One hundred and sixty Red Line cars were also rehabilitated. Fourteen out of 22 stations were made accessible.

Orange Line Improvements to the Orange Line include the south side relocation of service from Washington Street in the South End, Roxbury and Jamaica Plain to the Southwest Corridor. Nine new stations were built including commuter rail connections at Forest Hills, Ruggles and Back Bay. Subsequently, 195 new parking spaces were also added at Forest Hills. Station modernizations including platform lengthenings at Chinatown, Downtown Crossing and State allow for the running of six car trains. Chinatown Station improvements also included the reconstruction of the northbound platform and a new station entrance. A total of 120 new Orange Line cars were purchased. Twelve out of 19 stations were made accessible, and accessibility improvements at two additional stations are currently in progress.

Blue Line Improvements on the Blue line include track and signal improvements and the acquisition of 70 new Blue Line cars. Station and parking improvements at Suffolk Downs and Wonderland stations added 110 and 420 new parking spaces respectively. Suffolk Downs was made fully accessible and the outbound platform at State was made partially accessible.

Green Line Light rail improvements include upgrading of the track, signal and cable systems, as well as the acquisition of 100 new Green Line vehicles.

BUS AND TRACKLESS TROLLEY

Improvements to the MBTA bus system include ongoing bus fleet modernization, a new bus garage in Lynn, station improvements at Haymarket, a new terminal at Arlington Heights with 194 park-and-ride spaces, and improved service between the South End Medical Area, the Longwood Medical Area, Allston-Brighton and Cambridge. In addition, local bus routes that provide feeder connections to the new stations on the Red

Line and Orange Line were restructured. A new bus terminal is being constructed at Dudley Square in Roxbury. In the early 1980s, the MBTA renewed its Suburban Bus Program which provides funding to ten communities for local bus service in areas not served by MBTA local bus routes. The state began providing funding subsidies to private bus carriers which operate radial services to downtown Boston, feeder services to fixed rail transit stations, or local "suburban bus" services.

COMMUTER RAIL

Improvements to the commuter rail system have resulted in a doubling of ridership between 1983 and 1989. Systemwide improvements include the purchase of 44 locomotives, more than 200 new single-level commuter rail coaches and 75 bi-level coaches. In addition, track, platform and accessibility improvements at North Station, South Station and Back Bay Station were completed during this period. Specific improvements by line include the following (see also Figure 3-2):

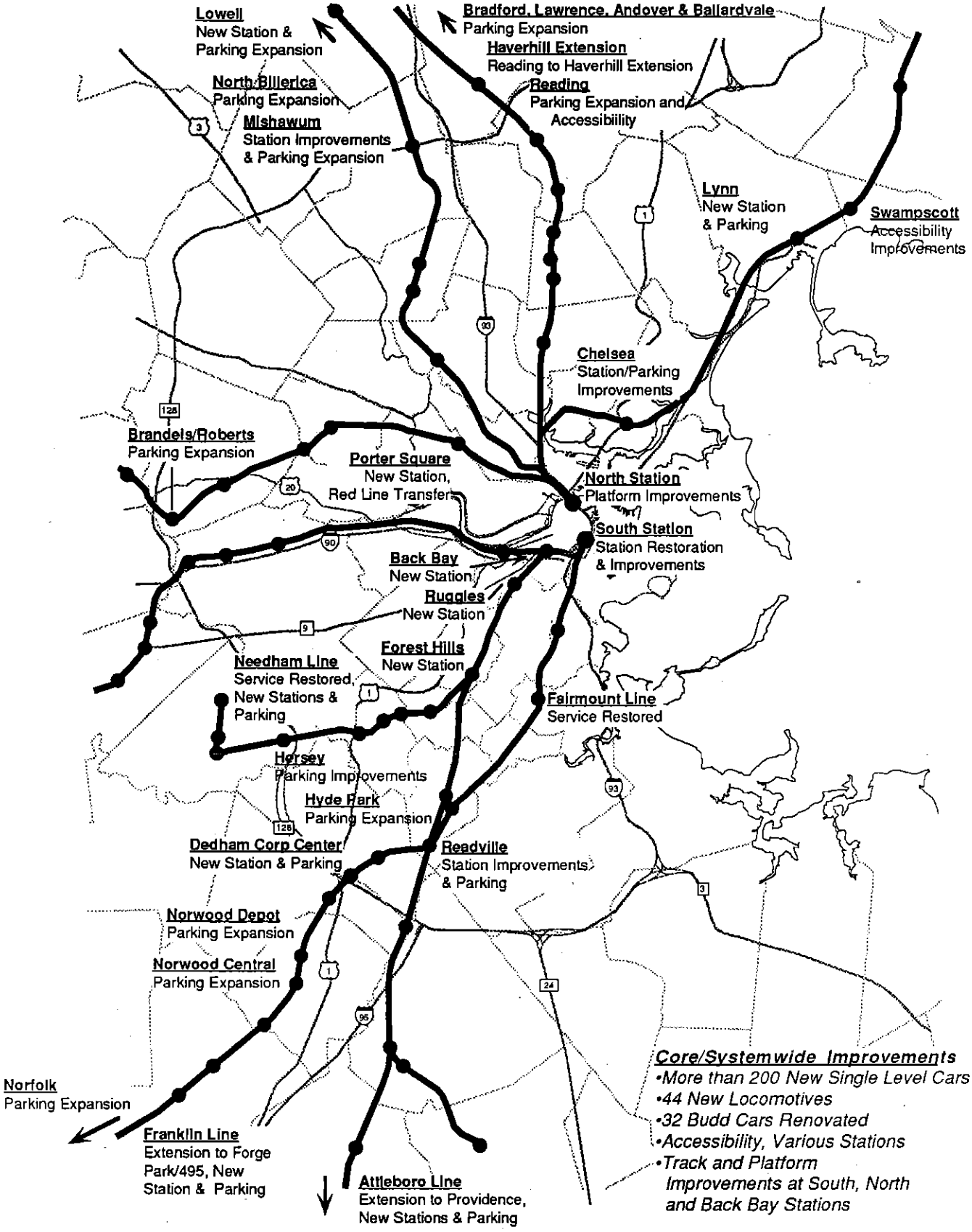
Rockport/Ipswich Line Station improvements include parking expansion at Lynn (800 new spaces) and Salem (430 spaces) stations, a new station in Chelsea (425 spaces) and accessibility improvements to Swampscott Station. Bridge construction projects include the Beverly-Salem Bridge, Draw 7 replacement over the Mystic River and the North Station Trestle. Except for Rockport, Prides Crossing and Chelsea stations, all stations on this line are accessible.

Haverhill Line Commuter rail service was restored from Reading to Haverhill with new station stops in Wilmington, Andover, Lawrence and Haverhill. Subsequent station improvements include parking expansion at Reading Depot (40 new spaces), Ballardvale (105 new spaces), Andover (18 new spaces), Bradford (200 spaces), and Lawrence (100 new spaces). Reading Depot was made accessible, and Bradford, Lawrence, Andover and Ballardvale are under construction for accessibility.

Lowell Line Improvements include the opening of a new station at Mishawum in September of 1984 (286 new spaces). Other parking expansions included North Billerica (110 new spaces) and the development of a transportation center at a new Lowell station (700 spaces). Lowell and Mishawum stations were made accessible.

Fitchburg/Gardner Line Parking and accessibility improvements to Brandeis-Roberts Station in Waltham added 77 new parking spaces. West Concord and Porter stations were also made accessible.

Figure 3-2
Commuter Rail Improvements Since 1978



Needham Line Rail service was restored and upgraded to Needham, West Roxbury and Roslindale. All eight stations are fully-accessible and provide a total of 860 parking spaces. Recently 150 parking spaces were added at Hersey Station in Needham.

Franklin Line Improvements include an extension from Franklin Center to Forge Park in Franklin with a 719-space park-and-ride facility. A new station was also constructed in Dedham, i.e. Dedham Corporate Center/128 with 500 parking spaces. Other station improvements include parking expansions at Readville (200 new spaces) and Norwood Depot (85 new spaces). Those stations made accessible include Forge Park/495, Norfolk, Norwood Central, Norwood Depot, Dedham Corporate Center and Readville.

Attleboro/Stoughton Line Improvements include Main Line work between Providence, R.I. and Boston with new stations in Providence (150 parking spaces provided by the state of Rhode Island) and South Attleboro (500 spaces). Southwest corridor improvements include the relocation of tracks from embankment to below-ground, with new stations at Forest Hills and Ruggles Station. Subsequent improvements to Hyde Park Station added 61 spaces. Stations made accessible include Providence, South Attleboro, Attleboro, Mansfield, Stoughton, Canton Center and Hyde Park.

Fairmount Line Commuter rail service through Hyde Park, Mattapan and Dorchester was restored. Station stops include Fairmount (30 spaces), Morton Street (50 spaces) and Uphams Corner.

COMMUTER BOAT

Commuter boat service between the Hingham Shipyard in Hingham and Rowe's Wharf in Boston was expanded in 1984 as mitigation for the reconstruction of the Southeast Expressway. Improvements to Rowe's Wharf have made this terminal a focal point for other water transportation services such as the shuttle service to Logan Airport. Other boat services that have been implemented include a Charlestown Navy Yard to Long Wharf route, and a route from Nantasket Pier in Hull (temporarily suspended as of December 24, 1991).

Table 3-1 organizes the major capital improvements by transportation corridor.

Table 3-1
Major Capital Improvements Completed Since 1978 by Corridor

Regional Core/Systemwide
- 58 new Red Line cars
- 100 new Green Line cars
- 120 new Orange Line cars
- 70 new Blue Line cars
- 44 commuter rail locomotives
- 200 commuter rail coaches
- Harvard to Alewife extension
- Quincy Center to Braintree extension
- Orange Line relocation
- Charlestown Navy Yard water shuttle
- E-Line to Heath Street restoration
- Station modernizations including platform lengthenings
- Station accessibility, various lines
- South, North and Back Bay Station improvements
- Fairmount Line restoration

Southwest
- Forge Park/495 extension
- Providence extension
- New Dedham Corporate Center station
- Readville, Norwood Central, Norwood Depot, Norfolk, Hyde Park, Ruggles and Mansfield station/ parking improvements

North Shore
- Lynn, Salem, Chelsea, Swampscott station/parking improvements

Northwest
- Mishawum, Brandeis-Roberts station/parking improvements

North
- Haverhill extension
- Reading, Ballardville, Andover, North Billerica and Lowell, Bradford and Lawrence

West
- Restoration of Needham Line
- Hersey parking improvements

South Shore
- Commuter Boat transit from Hingham and Hull

South
- Stoughton, Canton Center station/parking improvements

TRANSIT IMPROVEMENTS CURRENTLY UNDERWAY

According to current priorities, the MBTA is moving forward with a number of capital projects. These are as follows:

RAPID TRANSIT AND LIGHT RAIL

Red Line Eighty-six new Red Line cars will be purchased. In addition, Andrew Station will be modernized and Quincy Center Station and Wollaston will undergo access improvements. A new parking garage addition to hold 1,400 new parking spaces will be built at Quincy Adams Station.

Blue Line Improvements are underway to upgrade the entire Blue line including wheelchair access and platform lengthening to accommodate six-car trains. Also, the carhouse at Orient Heights Station is being upgraded for the maintenance and storage of Blue Line cars.

Green Line New accessible Green Line vehicles will be designed and every Green Line station will be modernized to include accessibility. Negotiations are underway to install new fareboxes on all Green Line vehicles. Yard improvements to Riverside Station and restoration of Arborway E-Line service from Heath Street will commence. The Green Line at North Station will be relocated to provide a cross platform connection to the Orange Line.

Figure 3-3 presents a map of rapid transit projects currently underway.

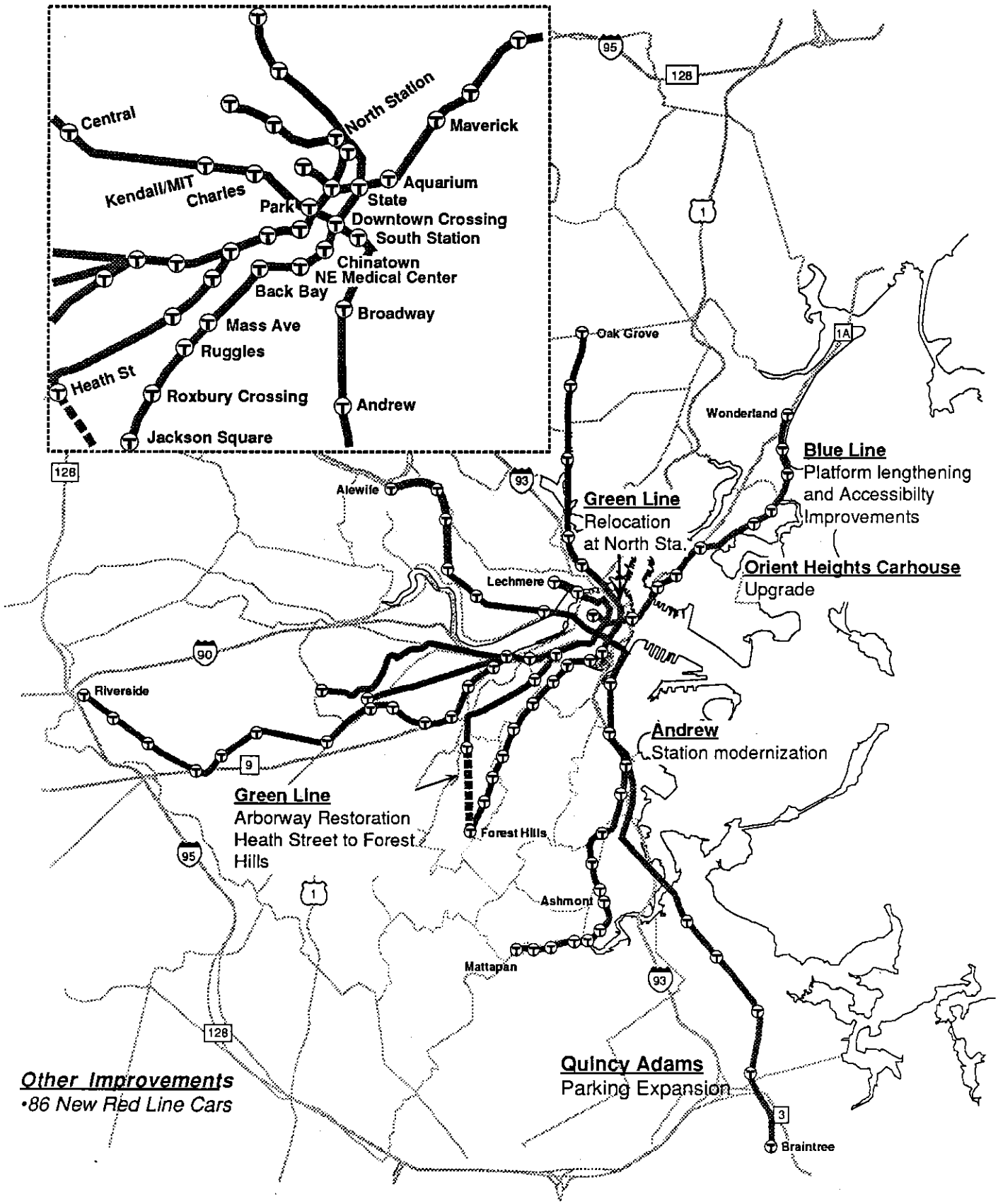
BUS AND TRACKLESS TROLLEY

Negotiations are underway to equip all MBTA buses with new fareboxes, and to equip 200 buses with air conditioners. A new bus terminal is being built at Dudley Square to replace the former bus station. Additional improvements to South Station include an above ground parking garage with high occupancy vehicle (HOV) access and a bus depot for private operators.

COMMUTER RAIL

Seventy-five bi-level commuter rail cars are now being placed into operation. As the Green Line relocation at North Station progresses, commuter rail platforms at North Station will be lengthened, the terminal upgraded and a 1,300-space underground parking facility constructed. The

Figure 3-3
Rapid Transit Improvements Underway



MBTA's bridge reconstruction program will address railroad bridge needs systemwide. Improvements underway by line are as follows (see Figure 3-4):

Haverhill Line Improvements to Haverhill Station will include a park-and-ride facility to contain 300 spaces.

Fitchburg/Gardner Line Improvements to Littleton/495 Station will add 300 parking spaces to an existing supply of 15. Improvements to Fitchburg Station will add 100 spaces to an existing supply of 20.

Framingham Line Station improvements to Auburndale, Newtonville and West Newton stations will accommodate 2 track operations. .

Franklin Line Design of an extension from Forge Park/495 to Bellingham is underway. Construction will include a new station with a 500-space park-and-ride facility and a nighttime layover facility.

Attleboro/Stoughton Line Parking improvements at Canton Junction and Route 128 stations will add 310 and 1,400 parking spaces respectively. Improvements to Northeast Corridor right-of-way will improve travel time between Boston and New York.

COMMUTER BOAT

Improvements are underway at the Hingham Shipyard to add 800 new spaces to an existing supply of 1,350.

Figure 3-4
Commuter Rail Improvements Underway

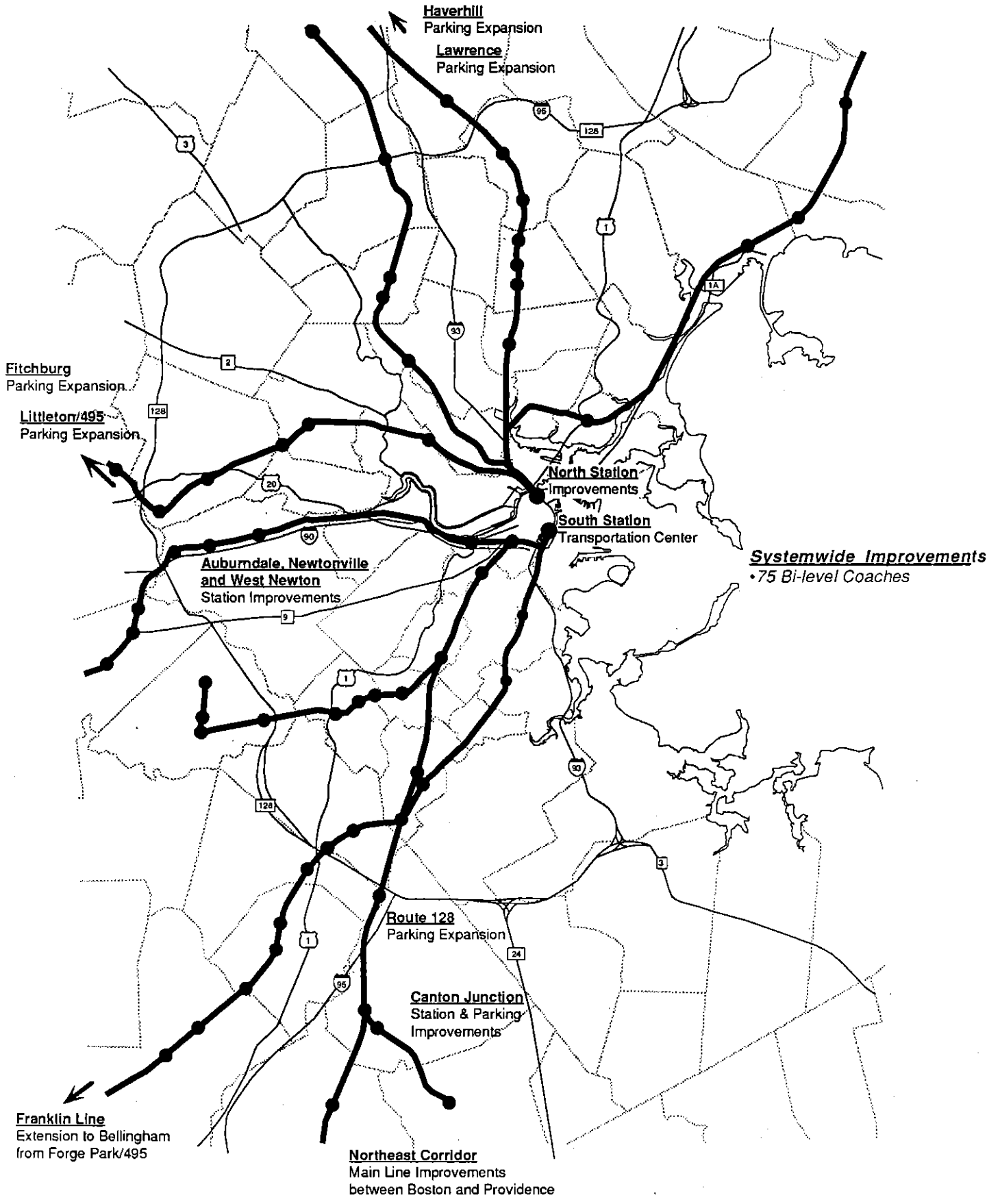


Table 3-2
Major Capital Improvements Underway

Regional Core/Systemwide
- 86 new Red Line cars
- Quincy Adams parking improvements
- Station modernizations
- Heath St to Arborway restoration
- Platform lengthenings on Blue Line
- 75 bi-level commuter rail coaches
- North Station improvements
- South Station transportation center
- Station accessibility
- Access improvements at Quincy Center and Wollaston stations

West
- Auburndale, Newtonville and West Newton station improvements

South
- Canton Junction parking and station improvements

South Shore
- Hingham Shipyard station/parking improvements

North Shore
- None

North
- Haverhill station/parking improvements

Northwest
- Littleton/495 and Fitchburg station/parking improvements

Southwest
- Bellingham commuter rail extension and layover facility
- Route 128 station and parking improvements
- Northeast corridor Main Line improvements

STATUS OF PROJECTS NOT IMPLEMENTED TO DATE

Eleven "new service" projects included in the 1978 PMT Update have not been implemented to date. They will be reevaluated as part of the current PMT Update effort in light of their present feasibility and their compatibility with the policies articulated in Chapter 4.

BLUE LINE EXTENSION TO LYNN

This project consists of an extension of the Blue Line from Wonderland Station in Revere along the Ipswich/Rockport commuter rail right-of-way. Two new stations would be constructed in West Lynn and Central Square. A connection to commuter rail would be available at the Central Square Station in downtown Lynn. The purpose of the project would be to improve transit service both to and from the city of Lynn, an old urban center in need of revitalization.

A draft Environmental Impact Statement was prepared and reviewed by the Federal Transit Authority (FTA), formerly the Urban Mass Transportation Administration, at the time of the last PMT update. In 1991, the project is listed in both the 2 to 5 year and future elements of the Transportation Improvement Program (TIP), a federally required planning document prepared annually for federal funding eligibility, namely FTA sections 3 and 9. Project implementation has been "deferred" due to funding limitations.

ORANGE LINE EXTENSION TO ROUTE 128

This project would be an extension of the Orange Line from Oak Grove along the Haverhill commuter rail line right-of-way with stations at approximately the same locations as the present commuter rail line in Melrose and Wakefield, i.e. at Wyoming Hill, Melrose, Melrose Highlands, Greenwood and Wakefield. An additional station, the proposed terminus, would be located at Route 128. Three vertical alignments alternatives have been studied, namely at grade, partially grade separated and fully grade separated. Grade separation alignments result in reduced impact on local traffic, but results in significantly higher capital costs.

The project was originally conceived to both reduce congestion at the inner Orange Line stations and attract new riders to the MBTA system. The Orange Line extension was estimated to save 9 minutes of travel time over an upgraded commuter rail making it one of the most effective projects in the PMT in terms of reducing travel time.

Extensive environmental review work done in 1975 revealed strong concerns about potential traffic congestion and unwanted new development. Because of these concerns and severe budget constraints, it was decided not to pursue this project in the near term. However, because of the substantial potential benefits to be realized from this project, it was retained as a possible future project. Since 1978, commuter rail improvements on the Haverhill Line have enhanced service in this corridor.

In 1991, the project is listed in the future elements of the TIP. Project implementation has been deferred due to funding limitations.

RED LINE EXTENSION TO ROUTE 128 (PHASE 2)

This project involves an extension of rapid transit service from Alewife Station to Route 128 on the Lexington branch railroad right-of-way. Stations are proposed at Arlington Center, Arlington Heights, Lexington Center and Route 128. The project was conceived when Red Line service terminated at Harvard Square. Phase 1, the extension of Red Line service from Harvard to Alewife Station, opened in the mid 1980s.

An extension beyond Alewife would provide substantial time savings to those riders in the northwest corridor who now access Red Line stations by MBTA feeder bus. It was estimated that by boarding a bus further out, a transit patron could save 2 to 15 minutes each way.

For planning purposes, the project is listed in the future element of the TIP. This project has been deferred due to local opposition and funding limitations.

GREEN LINE EXTENSION TO TUFTS COLLEGE IN MEDFORD

This project would extend the Green Line from Lechmere Station in East Cambridge through Somerville to a point near Tufts College in Medford. Lechmere Station would be relocated to the east side of the O'Brien Highway. Stations are proposed at Washington Street, McGrath Highway, School Street, Lowell Street, Ball Square (Broadway) and Tufts University. Alternative terminal locations considered included Ball Square and Washington Street in Somerville.

This project was originally conceived to provide a one-seat, one-fare rapid transit service to Somerville, a city of high population density, low auto ownership, lower than average incomes and a high percentage of elderly. Before Red Line stations at Porter and Davis squares opened, residents had no

choice but to take a bus over congested city streets to rapid transit stations in Cambridge and Charlestown.

For planning purposes, the extension project is listed in the future element of the TIP. In 1988 funding was allocated to continue the environmental review and alternatives analysis.

The relocation of Lechmere Station is being carried as a project distinct from the extension. Presently, the MBTA is undertaking engineering and design activities.

GREEN LINE EXTENSION TO BRIGHTON

This project would restore Green Line service from Kenmore Square as far as Oak Square in Brighton, short of a full restoration of the old A Line to Watertown Square. LRVs would operate on existing tracks in the street along Washington and Cambridge streets between Oak and Union squares. Tracks would be rebuilt in mid-street reservation between Union Square and Packards Corner, along Brighton Avenue, to where it meets the B Line on Commonwealth Avenue. The existing tunnel would be used between Kenmore Square and Park Street. This line would replace existing MBTA bus service (Route #57) that terminates at Kenmore Station.

This project is designed to provide a one seat ride to patrons from Brighton and Allston who wish to use the Green Line service to reach downtown destinations.

For planning purposes, the project is listed in the future element of the TIP.

WASHINGTON STREET REPLACEMENT SERVICE

This project would replace Orange Line service that was relocated to the southwest corridor. The MBTA conducted a study of alternative methods of improving transit service in the South End, Roxbury, North Dorchester and Mattapan. The preferred alternative is a trackless trolley operation via Washington Street connecting Dudley Station terminal with the proposed South Boston Piers Transitway at Boylston Street Station.

This project, broken down into 2 phases, is programmed in the annual and 2 to 5 year elements of the TIP. Funding in 1992 would allow for the design and construction of Phase 1 Dudley Square to Downtown Crossing along Washington Street.

RAIL SERVICE TO BROCKTON

This project was originally conceived to provide better service to patrons in the Brockton area. The project would restore rail service from Brockton over the existing railroad right-of-way between Brockton and Quincy. Service options included 1) an extension of the Red Line from South Braintree, 2) a separate commuter rail line to South Station, 3) a railroad shuttle to the Red Line, and 4) a special lightweight diesel rail car operating on a separate right-of-way beyond Quincy and sharing Red Line tracks north of Quincy.

Since 1978, proposals to restore commuter rail service to southeastern Massachusetts gained momentum. Today, the MBTA is moving forward to restore service along the Middleborough, Plymouth and Greenbush branches of the former Old Colony railroad. Three stations are planned in Brockton on the Middleborough Line.

The Final Environment Impact Statement for the Old Colony Railroad Rehabilitation project is being reviewed by FTA. Approval is expected in early 1992.

CIRCUMFERENTIAL TRANSIT

This project was originally conceived to provide new or improved service in a circumferential corridor around the fringe of the Boston Central Business District, connecting the Sullivan Square area of Charlestown, East Cambridge, MIT, Boston University, Northeastern University and the proposed Roxbury replacement service. Additional service was considered to connect to either the Columbia Point or South Boston areas. The study of service to South Boston was later separated from the Circumferential Study to become the South Boston Piers Feasibility Study. Transfer stations may be located at intersections with the rapid transit and light rail. The new service would result in significant user time savings and would clear much of the peak period congestion at the downtown transfer stations. Also, the line would provide an important new link among the major educational, medical and cultural institutions along this corridor, as well as for the new industrial areas being developed in Somerville and Cambridge.

Since 1978, a number of ongoing planning studies have been conducted to identify and analyze technology alternatives. The project is programmed among the annual, 2 to 5 year, and future elements of the 1992 TIP. In 1991, the project is described as "a circumferential transit system within a 5 mile radius of downtown Boston, in a corridor to be identified through the planning process, linking existing radial lines and activity centers."

BROOKLINE VILLAGE CONNECTOR

This project would result in the construction of a short piece of new track from the Brookline Village Station, on the Riverside Branch of the Green Line, to E Line on Huntington Avenue. This project would allow for the operation of service from Brookline Village to Huntington Avenue, not currently served by the Riverside Branch. The service would enable transit users boarding in Newton and Brookline to access the hospitals, museums and educational institutions without having to switch trains at Copley.

New building construction in the Brookline Village area makes construction of this connection difficult. The current TIP indicates that further study will be necessary to determine the feasibility of this project.

NORTH STATION-SOUTH STATION CONNECTOR

This project would construct a rail link, either subsurface or surface, between North and South stations, as part of the Central Artery Third Harbor Tunnel project. The new tunnel would run parallel to the depressed artery and would include underground platforms at North Station, at State Street in financial district and at South Station. Intercity and commuter trains would enter the tunnel by switching from existing tracks on the approach to North and South stations. The link would improve the downtown distribution characteristics of the commuter rail and provide through inter-city train service from Maine and the North Shore to points south of Boston

In 1991, the project is included in the future element of the TIP. Alternatives for this project will be addressed as part of a parallel planning study.

BOWDOIN-CHARLES CONNECTOR

This project would extend the Blue Line four-tenths mile from its downtown terminal at Bowdoin Street to Charles Street on the Red Line. The new line would be located in a tunnel underneath Cambridge Street with a new below level Blue Line station at Charles Street. Blue line trains would reverse direction at Charles Street through the use of tail tracks and switches.

All rapid transit lines except for the Blue and Red lines intersect each other in the downtown Boston area. This project would provide that connection. This would improve transit accessibility between the communities of the inner Northwest corridor served by the Red line and the

communities of the North Shore served by the Blue Line. Travel time savings would be realized to those people who now make two transfers and to those who walk an extra distance to avoid the double transfer.

The Bowdoin-Charles project would improve the downtown distribution characteristics of the transit system while increasing the peak-hour capacity. In 1991, the MBTA completed an analysis of three alternatives for access at Charles Street Station. The project appears in the 2 to 5 year and future elements of the 1992 TIP.

Chapter 4
Policy Framework

MISSION STATEMENT

The mission of the government agencies which plan, construct, maintain and operate the transportation system of Massachusetts is to maximize the mobility of people and goods. Mobility promotes economic vitality, allows for freedom of movement, and provides fair opportunity for all people to participate in society. These aims are integral to the welfare of the citizens of Massachusetts and to the competitiveness of firms which do business here.

Public transportation, the primary focus of this document, has the mission of moving large numbers of people in an efficient way, promoting economic vitality, but minimizing negative impact on the environment.

Policies of the transportation agencies translate this mission into the specific ways that the agencies maximize mobility. These policies must be periodically updated to recognize legislative mandates and other circumstances that affect investment decisions in the maintenance, operation, or expansion of the existing transportation system.

LEGISLATIVE CONTEXT

Recent legislation at the Federal level influences current transportation policies. Three acts in particular affect transportation planning:

- The Americans with Disabilities Act of 1990.
- The Clean Air Act Amendments of 1990.
- The Intermodal Surface Transportation Efficiency Act of 1991.

The Americans with Disabilities Act mandates accessibility for all transportation facilities. The Clean Air Act Amendments set in place new deadlines for attaining air quality standards for ozone and carbon monoxide, the two most common air pollutants associated with mobile emissions sources. Finally, the Intermodal Surface Transportation Efficiency Act contains guidelines for transportation system planning with a clear emphasis on intermodal programs and management systems.

INTERMODALISM

To address the mandates set forth in these acts, the agencies which are responsible for the various components of the transportation system must work together to determine policies which are applicable to the system as a whole. While this policy document is principally concerned with public transportation, it must also consider other modes of travel which are interdependent with mass transit. Non-traditional transit modes such as high occupancy vehicles blur the distinction between transit and highways, reinforcing the need to take a broad perspective of the transportation system.

OUTLINE OF POLICIES

The policies of the transportation agencies are organized under five categories as outlined below. Neither the mission stated above nor the individual policies stated below are intended to stand on their own. Rather, the mission and policies taken as an integrated unit provide a basis for planning the future transportation system which maximizes mobility while minimizing negative impacts.

I. Transportation System Improvements

A. Maintain and upgrade the existing system.
B. Provide better integration between various components of the transportation system.
C. Reduce congestion on existing services and facilities.
D. Make existing services accessible to people with disabilities.
E. Ensure an equitable provision of services.
F. Ensure the safety and security of transportation system users.
G. Maximize the value of future investment.

II. Economic Vitality and Regional Development

A. Implement transportation investments that stimulate and sustain regional economic development.

B. Improve transportation in a manner that enhances the competitiveness of businesses and the economic vitality of communities and neighborhoods.
C. Encourage development in the urban core.
D. Support compact development.
E. Improve and develop the transportation system's ability to provide access in accordance with adopted land use plans.

III. Environmental Quality

A. Minimize air pollution.
B. Minimize water and soil pollution.
C. Minimize usage of land for transportation facilities.
D. Minimize noise and vibration impacts.
E. Minimize community disruption and negative visual impacts.
F. Encourage incorporation of public art in transportation facilities.

IV. Energy

V. Costs

TRANSPORTATION POLICIES

I. POLICY ON TRANSPORTATION SYSTEM IMPROVEMENTS

The transportation system should provide mobility for all people in the region. Its principal role is to facilitate access to work locations, retail facilities, recreational areas and other destinations. It must also provide for the efficient movement of goods and services into and throughout the region.

A. Maintain and upgrade the existing system.

Past investment in transportation facilities in the Boston region totals many billions of dollars. This investment has resulted in a system that people and firms rely on every day. Protecting that investment by maintaining and upgrading facilities and services which meet a demonstrated need is a top priority.

Maintenance is one of the most cost-effective uses of today's dollars, since a relatively small amount of money is needed to keep the system in good condition, compared to the amount that was spent to build it. Deferred maintenance may save money in the short run, but in the long run it may be more expensive than regular preventive maintenance. The value of regular maintenance resides not only in smoother, faster rides, but also in safety, longer equipment life and fewer breakdowns. Highway upgrades can improve safety and capacity; rail upgrades such as better track, better power distribution, better rolling stock and other innovative improvements can yield significant enhancements in mobility.

B. Provide better integration between various components of the transportation system.

One of the key goals of the recently enacted federal transportation legislation, the Intermodal Surface Transportation Efficiency Act of 1991, is to promote the integration of transportation modes, including auto, bus, carpool, vanpool, rail, boat, bicycle and pedestrian. This integration results in greater mobility because the various modes complement each other; the whole is greater than the sum of the parts.

Investment choices should be based in part on the way in which an improvement to a single transportation mode can make the system as a whole work better. There are a number of ways in which this can be done:

1. **Improve connections between modes to maximize the effective use of each mode.**

   Connections between modes are crucial to the effectiveness of transportation services. Allowing for safe and convenient transfers between modes improves the overall efficiency of transportation by promoting a better distribution of travelers among available modes. This, in turn, can minimize congestion on a single mode and thus reduce average travel times. Connecting all parts of the system allows each part of the system to help the others; transit services help highways to function and vice versa. Common types of connections include walking to bus stops, biking to transit stations, and driving to park and ride facilities.

2. **Improve choices for travellers in specific corridors by providing alternative means of travel.**

   Where demand is sufficient, new or improved services are important to encourage the use of transit or high occupancy vehicles (HOVs, i.e. carpools, vanpools and buses) as options within specific corridors. These new services should be carefully examined to assure that they are compatible with other modes within the same service area.

3. **Encourage public-private cooperation in the provision of transportation services.**

   Business and employer assistance is essential to improve the use of transit and HOVs. Both private businesses and public agencies should work to encourage new riders and retain existing riders. Examples of this type of public-private cooperation include CARAVAN for Commuters, Inc.; the establishment of shuttle bus routes by private Transportation Management Associations (TMAs) and major employers; subsidizing private express commuter bus services; and public-private joint development and maintenance at commuter rail and transit stations.

4. **Improve marketing of available services.**

   Increased information on the effectiveness of public transportation, ridesharing or using HOVs on highways, bicycling, walking, as well as potential cost savings to riders, should be provided to the travelling public. This can be carried out on a regionwide basis by state agencies such as the MBTA and the Massachusetts Highway Department as well as private non-profit companies such as CARAVAN for Commuters, Inc., and by TMAs on a local basis.

C. Reduce congestion on existing services and facilities.

Congestion on existing facilities results in wasted time, reduced efficiency and high levels of dissatisfaction among the traveling public. It also aggravates the air quality problems associated with transportation. To reduce congestion, transportation improvements should be directed towards relief of users of existing facilities and services, without restricting mobility or causing problems to occur at other locations. Examples of how this can be done are as follows:

1. **Operate existing facilities more effectively (Transportation Systems Management).**

   Existing facilities can be improved by providing better intermodal connections, and through operational improvements. Rail systems can be operated more efficiently by improving signal systems to allow higher speeds, by operating at more frequent headways, and by making other operational improvements. Bus lanes and traffic signal preemption for transit vehicles helps to reduce delays and congestion on individual buses and trains. Better operation of the highway system is now being addressed through congestion management efforts, including incident management, ramp metering and "intelligent vehicle highway systems" (IVHS) that exploit advanced technologies to improve management of fleet and user operation.

2. **Encourage use of more efficient travel modes by improving the attractiveness of mass transportation services and providing facilities for HOVs.**

   The attractiveness of various modes of travel depends on a number of factors including time, cost, comfort, reliability, security, convenience, flexibility, physical attractiveness, and so forth. Improvements in these areas help to make HOVs and mass transportation more competitive with single-occupancy vehicle travel.

3. **Improve facilities for bicyclists and pedestrians to encourage non-motorized transportation.**

   Improved conditions for bicycle travel on streets and highways, additional bicycle parking, expansion of the bikeway network and improvements to the pedestrian environment encourage people to use these alternative ways to travel. Wherever possible, new transportation projects should be planned to enhance the safety and attractiveness of bicycle and pedestrian travel in the project area.

4. **Encourage employers to participate in congestion reduction programs (Transportation Demand Management).**

   Reduction of travel demand through employer based ridesharing efforts can be effective in alleviating congestion. Another program is flextime, which helps to shift peak period trips to off-peak periods. Telecommunications advancements may provide options to trip making.

5. **Expand existing facilities.**

   Expanding existing facilities is often the most direct way to alleviate congestion (although not always the most cost-effective). Transit capacity can be expanded by providing more frequent service, operating longer trains or higher capacity buses, and by adding parking at suburban stations. Highway capacity can be expanded by adding lanes, increasing the capacity of specific ramps or interchanges, or by adding incentives for HOVs such as head-of-queue privileges or HOV lanes.

6. **Improve information dissemination.**

   Improved methods of providing information about congestion trouble spots may make travellers more aware of the available options as to travel choices including route, mode, and time of travel. Advanced systems of telecommunication may also provide improved information concerning congestion.

D. Make existing services accessible to people with disabilities.

Transit and paratransit systems must be made accessible to persons with physical or other disabilities in accordance with the Americans with Disabilities Act.

E. Ensure an equitable provision of services.

Transportation systems should be designed to provide equitable service and reinforce the economic and social vitality of the region's communities. Transportation investment decisions should be made through an open and participatory process which includes a broad representation of interested persons and groups.

F. Ensure the safety and security of transportation system users.

Before using a part of the transportation system, travellers must be confident of a safe and secure trip, including the time spent in stations and in transfer between vehicles. Physical safety can be ensured through careful

attention to design, redesign and upgrading of facilities and modes, and through effective maintenance. Operational safety can be ensured through adherence to proper operating procedures and through policing of facilities.

G. Maximize the value of future investment.

Transportation and land use have a symbiotic relationship—each needs and builds upon the other. This relationship entails a close compatibility of plans: transportation facilities should be built to serve well-developed land, and land should be developed more intensively where there are adequate transportation facilities. Transportation planning should take into account sound local and regional land use planning so that the projects with the greatest likely future benefits will be selected for present and future construction.

II. POLICY ON ECONOMIC VITALITY AND REGIONAL DEVELOPMENT

Transportation improvements must contribute to a healthy, active economy and serve as a stimulus for future growth. The transportation system should support economic development by assuring efficient, safe and reliable movement of employees and commerce throughout the region by reducing the time and cost of commuting, shipping goods, and other travel needs. Transportation service can enhance development opportunities. Thus the policy of economic vitality is closely linked with land use policies in supporting the investment of transportation infrastructure in concert with state and regional land use goals.

A. Implement transportation investments that stimulate and sustain regional economic development.

The transportation system is fundamental to and intertwined with economic activity. Transportation can support economic development by improving transit and highway access to developing areas, by increasing transportation services in economically disadvantaged areas and by locating transportation services in areas where new development is desired.

B. Improve transportation in a manner that enhances the competitiveness of businesses and the economic vitality of communities and neighborhoods.

Transportation facilities should aid in the beneficial and continual renewal of the businesses and communities that they serve. New transportation construction or improved transit accessibility can serve as the catalyst necessary to stimulate private investment, and encourage other public investment in these areas. Transportation improvements and new facilities should be undertaken in conjunction with local redevelopment efforts while being sensitive to the transportation impacts on the character of communities.

C. Encourage development in the urban core.

The economic health of the region is dependent on the vitality of the urban core because of the high concentration of economic activity in Boston, Cambridge, at Logan Airport and in the neighborhoods adjacent to these areas. The existing focus of transportation on the urban core, built up over three centuries, allows it to sustain a high density of commercial and residential development. This focus should be maintained and enhanced.

D. Support compact development.

Compact mixed-use development brings jobs, housing and shopping closer together. Trips are shorter, which encourages walking and bicycling. In addition, it is possible to institute some public transportation facilities because density is higher. Old cities of the region already have compact mixed-use development. These should be supported by transportation facilities in their effort to maintain or regain their economic vitality. The economic health of the region is also dependent on the vitality of the "edges" of the metropolitan area. Since an efficient intermodal transportation system is not in place in many of these areas, the public and private sectors should work together to develop such systems. Future development in edges of the metropolitan area should be encouraged when they contribute to and support the creation of such intermodal transportation systems.

E. Improve and develop the transportation system's ability to provide access in accordance with adopted land use plans.

The transportation network should be improved by the provision of expanded transit and paratransit services to encourage new development in accordance with local and regional planning and policies. MetroPlan 2000, the land use plan for the Boston region created by the Metropolitan Area Planning Council, endorses concentrated development in areas already well-served by transportation infrastructure and is one guide for transportation planning and attendant development.

III. POLICY ON ENVIRONMENTAL QUALITY

Transportation affects the environment by producing air pollution, by producing runoff that affects soil and drinking water, by taking up land, and by affecting communities with noise and visual impacts. The regional transportation system must be planned, designed, constructed, operated and maintained to preserve and enhance environmental quality.

A. Minimize air pollution.

1. Encourage use of efficient travel modes.

Air quality can be improved without impairing mobility by encouraging people to travel in those modes which reduce the average amount of emissions per passenger mile. A four-person carpool emits one quarter as much per passenger mile as a single occupant car, and a bus full of people a small fraction as much per passenger mile. Bicycle and pedestrian travel produces no emissions.

2. Encourage use of low pollution fuels and engine technology.

Alternative fuels and new engine technologies which emit fewer air contaminants should be developed and used wherever possible. Alternative fuel experimentation with fleet vehicles should continue and be implemented when it is judged to be feasible.

3. Achieve mandated air quality standards.

The Federal government has established air quality standards for carbon monoxide and ozone. The Clean Air Act Amendments of 1990 reestablish timetables for meeting these standards: for carbon monoxide by 1995 and for ozone by 1999. Nitrogen oxides, particulates and air toxics are also regulated by the amendments and may need to be reduced to comply with the Act. The amendments provide new guidance on how reductions will be achieved, and consistent with this, a new State Implementation Plan will be developed. The transportation agencies will play a major part in achieving these standards and will need to implement measures consistent with emission reduction goals.

B. Minimize water and soil pollution.

Design and construction of facilities should assure that materials used in operations and maintenance, such as road salt, as well as runoff containing petroleum products, trace metals and particulates will not have serious impacts on soil and water.

C. Minimize usage of land for transportation facilities.

Modes of travel which can transport many people with few vehicles typically use less land than modes which require many vehicles to transport many people. Examples include HOV lanes and transit lines. Of course, almost any facility can be made to take up less land by putting it underground or on air rights above existing facilities. This can be expensive and would only occur where land is extremely valuable and/or already densely developed.

D. Minimize noise and vibration impacts.

Although transportation facilities have great benefits for the region, they have some negative effects on the people living near them. Cars and trucks on expressways make a significant amount of noise, and trains make their presence known with track noise and a rumble of vibrations. These impacts can be mitigated with a variety of noise barriers and trackbed improvements. To the extent that it is feasible, noise and vibration impacts should be reduced.

E. Minimize community disruption and negative visual impacts.

There have been many instances where transportation structures have divided communities. Elevated roads and tracks, embankments and open cuts all inhibit access across rights-of-way to some extent. The trend in recent years has been to remove these barriers and this trend should continue. When possible, future elevated structures and embankments should be avoided. Transportation facilities should complement and build upon the existing historic and architectural character of the region. In planning new facilities, sensitivity to local design issues can help minimize adverse impacts on communities, neighborhoods and open spaces, through appropriate right-of-way treatment (landscaping, noise barriers, grade separation, etc.), and through other actions as identified in environmental studies.

F. Encourage incorporation of public art in transportation facilities.

The everyday act of commuting can be enhanced and the public experience can be expanded through the commissioning of the highest quality art in public spaces. Public awareness of the unique culturual and ethnic resources of communities surrounding transportation facilities can be enhanced by integrating art into the design of upgraded and new facilities. Such awareness would encourage a sense of public "ownership" and responsibility towards vandalism-proof installation. In addition, adequate art management and maintenance programs should be developed to protect the public investment.

IV. POLICY ON ENERGY

Minimize use of energy resources.

Efficient modes of travel such as transit and ridesharing save energy by using fewer vehicles to carry a given number of people. As vehicle occupancy rates increase, the amount of energy used per passenger mile decreases. Thus carpools are more efficient that single occupant cars, vanpools are more efficient than carpools, buses are more efficient than vanpools and trains are more efficient than buses. From this standpoint, pedestrian travel and bicycling are the most efficient since they use no fossil fuel or electricity at all. Research and development of alternatives to fossil fuels should be continued and their use be encouraged when feasible.

V. POLICY ON COSTS

Transportation resources should be used as efficiently as possible. Funds from all sources are limited and should be expended so as to maximize mobility. The best way to ensure efficiency is to coordinate transportation agency activities through comprehensive planning and programming. This effort must achieve the following objectives:

A. **Achieve an optimal balance between mobility and total cost (including both capital and operating costs).**

B. **Re-invest in existing assets where investment will assure continued usefulness while maintaining a compatibility with the environment.**

C. **Undertake careful analysis of all projects including low-cost alternatives to each project.**

D. **Expand the system using means of programming which give priority to projects which require a minimum of capital outlays, all other things being equal.**

E. **Leverage private resources, wherever possible, to assist in providing services or facilities.**

F. **Leverage federal funds where possible.**

Chapter 5
Projects Organized by Research Theme

METHOD FOR ORGANIZING THE TRANSPORTATION PROJECTS PROPOSED IN PHASE 1 FOR ANALYSIS IN PHASE 3

Chapter 5, Projects Organized by Research Theme, and Appendices A and B present an organization of the Phase 1 public comments into categories to facilitate a comprehensive review and testing of projects and alternatives in order to identify the most beneficial transportation projects. The initial sorting of suggested projects has resulted in three divisions:

- Capital Projects
- Operations Related Projects
- Other Projects

From this division, the project suggestions are organized into three categories for research and analysis:

- Parallel Planning Studies
- Research Themes
- Agency Response and Action

A visual representation of this organization of suggested projects is presented in Figure 5-1. The main focus of work in Phase 3 of the PMT will concentrate on analyzing capital projects within research themes in order to evaluate projects and compare those which may have similar effects on the system.

Capital Projects This category contains the suggested projects that will have capital implications for the MBTA. Some of these projects are the subject of a parallel planning study and are noted in Appendix B. The main focus of Phase 3 of the PMT will be to evaluate the comparative need for and benefit of these capital projects within research themes.

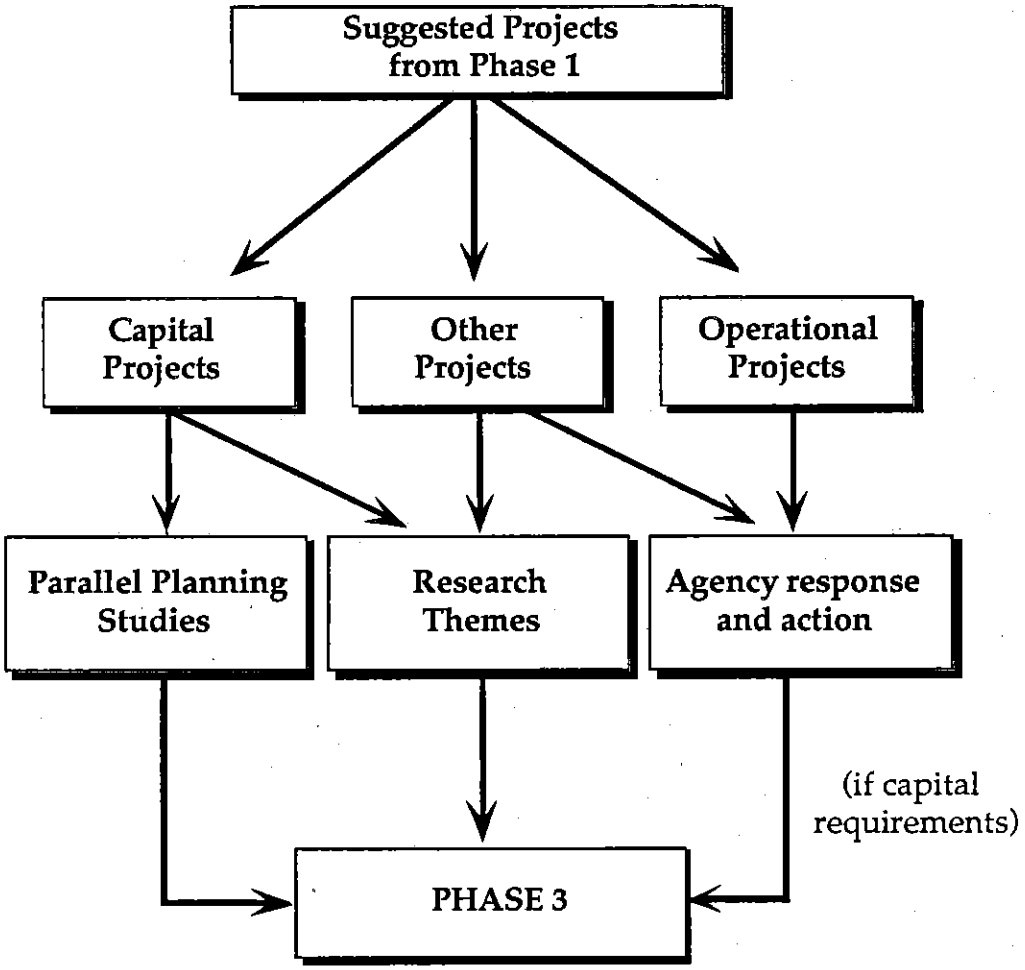
Operations-Related Projects Each suggestion that is operational in nature has been identified and is listed in Appendix A. This list has been

forwarded to the MBTA Operations Department for study and comment. During Phase 3, a document will be produced which responds to these suggestions. Operations related suggestions which are found to have capital implications will be reintroduced into the Phase 3 study for evaluation.

Other Projects Some of the suggestions for projects made in Phase 1 did not fit in either the Operations Related Projects category or the Capital Projects category. These project suggestions incorporate concerns, among others, about the need for marketing improvements, transportation demand management (TDM) initiatives and fare policy and fare structure revisions. Comments from this category are either included in a research theme in Chapter 5, contained in Appendix A or are noted as the subject of parallel planning studies in Appendix B.

Figure 5-1

Phase 2 Process



METHOD OF STUDY FOR PHASE 3

Phase 3 of the Program for Mass Transportation will evaluate proposed projects that have capital implications. Those with capital implications have been sorted into seven research themes to help in structuring an organized and comprehensive approach to the project analysis. This grouping by research theme will enhance the evaluation of the merits of each project and encourage a comprehensive review and testing of alternatives. Comparing among the various modes and testing of alternatives that can serve a specific type of travel demand will be necessary in order to plan the most effective system possible. The seven research themes are:

- **Maintain and Upgrade the Existing System**
- **Intermodal Connections**
- **Urban Core Distribution**
- **New Radial Services**
- **Suburban Circumferential Movement**
- **Regional HOV System**
- **Transportation Demand Management**

In addition to the PMT planning process, there are other parallel planning efforts which have been undertaken or are scheduled to be started in the near future by the MBTA and other state and federal agencies. A listing of these other planning studies is contained in Appendix B. Each project is listed with a brief description of the planning effort and a statement on the status of the planning process.

Phase 3 of the PMT will rely on these parallel planning studies as a resource in determining the relevant characteristics of individual projects. This will allow for a more efficient allocation of resources in evaluating the relative merits of projects within research themes. When a planning study sufficiently defines the demand for, benefit of and capital implication of a project, the findings from that study will be incorporated into the Phase 3 PMT evaluation process.

The product of the Phase 3 analysis will be a list of proposed projects that seeks to integrate transit and automobile use with additional modes of travel such as water transit use, pedestrian travel and bicycle use. Emphasis will be placed on identifying projects that enhance and reinforce the intermodal connections among existing modes of travel now provided by public and private transportation agencies.

The efforts of Phase 3 will lead to the adoption of a new PMT by June 30, 1993. This new PMT will present a list of proposed projects to meet the future transit needs of the Boston Metropolitan region over the next two

decades. The adopted PMT will be further refined in Phase 4, during which time it will be coordinated with the revisions to the State Implementation Plan, which are due by November 15, 1993.

SUGGESTED PROJECTS ORGANIZED BY RESEARCH THEME

The following suggestions for projects are organized according to research theme. It should be noted that these suggestions do not necessarily reflect the opinion of EOTC or the MBTA. While every suggested project is not specifically listed in this chapter, each project will be the subject of study during the PMT process. The inclusion of a suggestion does not imply any judgment on project feasibility.

Research Theme: Maintain and Upgrade the Existing System

Throughout most of the 1980s and continuing into the 1990s, there has been a major emphasis on upgrading the existing MBTA system. Most MBTA facilities and rolling stock have, in fact, been upgraded, renovated, and/or replaced. In addition, maintenance has been improved, which has resulted in more reliable service. As stated in the transportation policy section (Chapter 4 of this document), maintenance and upgrade of the existing system will continue to be a top priority. These improvements attract new riders to the existing system and make the system more convenient and comfortable for existing riders. Examples of such projects are listed below.

Improve Accessibility throughout the System
The Americans with Disabilities Act (ADA) requires all public transportation facilities to be made accessible to those with disabilities. This includes making all existing rapid transit, light rail, buses, commuter rail vehicles and stations accessible and improving the "user-friendliness" of the system to people with disabilities. All changes to the system must incorporate measures to improve accessibility.

Modernize/Improve Rapid Transit and Commuter Rail Stations
Many rapid transit and commuter rail stations were modernized in the 1980s. Modernization of the remaining stations, including accessibility improvements, would bring them up to the standards of the rest of the system and provide a better environment for riders. Any modernization project should ensure that provisions are made to accommodate pedestrian and bicycle use.

Provide Protected Passenger Waiting Areas at High Volume Bus, Commuter Rail and Commuter Boat Stops
Bus, commuter rail and commuter boat headways are often longer than rapid transit headways, and therefore waiting times are often longer. The construction of permanent, enclosed passenger facilities at high volume commuter rail and commuter boat stations and bus stops could make service more attractive and comfortable. At high volume bus, commuter rail and commuter boat stops where ridership is not high enough to justify enclosed facilities, passenger convenience could be improved by installing shelters.

Increase Capacity
Projections indicate that long-term ridership growth will occur throughout the system. There are a number of ways in which the existing system can be modified to accommodate higher ridership levels:

Use Higher Capacity Equipment High capacity equipment can increase line capacity without lengthening platforms. Examples include the bi-level commuter rail cars now being placed into service, or articulated buses that are used in other parts of the country.

Operate More Frequent Service on Existing Lines The capacity of existing rapid transit, commuter rail, bus and water ferry lines could be increased by operating more frequent service. This may require the purchase of additional equipment.

Extend Platforms Platforms on the Red and Orange lines were lengthened during the 1980s to accommodate six car trains. The same will be done on the Blue Line in the near future. Similar improvements could be implemented at Green Line subway and surface stations. On commuter rail, full length high platforms at stations boarding over 600 people a day could decrease loading and unloading times.

Turnaround Tracks Turnaround or "pocket" tracks in congested areas of the rapid transit and light rail systems would permit a greater frequency of service. This is especially applicable within the central core area.

Reduce Travel Times

Reductions in transit travel times would make transit more competitive with automobile travel. Travel times could be reduced as follows:

Red, Blue, and Orange Lines The Red, Blue, and Orange lines operate on their own rights-of-way and are not subject to delays experienced by modes that operate in mixed traffic. As a result, service on these lines is relatively fast. However, there are ways to improve travel times:

Increase Operating Speeds Rapid transit operating speeds are generally limited by close station spacing. However, in some cases, such as on the northern half of the Orange Line and the Braintree branch of the Red Line, it may be possible to operate trains at higher speeds by upgrading track and/or using higher speed equipment.

Reduce Headways Since people include waiting time in their calculation of travel time, reduced headways can reduce total travel time. Currently, service is frequent during peak hours and waiting times are relatively short. Further reductions in travel times could be achieved by operating more frequent service. This may entail purchasing more equipment or utilizing existing equipment at a higher rate.

Reduce Delays New, more reliable equipment and improved maintenance could reduce delays. This is especially relevant on the Red Line and during inclement weather.

Green Line Surface and subway service on the Green Line is heavily utilized. On the surface, operating speeds are slow because of traffic signals and congestion. In the subway, operating speeds are slow because of vehicle congestion, sharp curves, and long dwell times caused by heavy passenger volumes and vehicle design. Possible changes to Green Line operations to reduce travel times are as follows:

Run Longer Trains at Slightly Longer Headways Green Line service is, for the most part, configured in two car trains during peak periods. One means of reducing delays due to train congestion (i.e., bunching of the Green Line trains) would be to operate Central Subway service with longer trains at slightly longer headways. This would require platforms to be lengthened and the power system to be upgraded.

Straighten Curves/Eliminate Train Conflicts There are a number of sharp curves and train conflicts in the Central Subway that reduce operating speeds and cause delays. The straightening of curves would permit higher operating speeds, and the elimination of train conflicts would reduce delays caused by one train having to stop to wait for another to pass.

Use Low Level Vehicles The stairs on existing Green Line vehicles increases the amount of time required for passengers to enter and exit cars. The planned use of low-level cars, which will be wheelchair-accessible, will reduce dwell time in stations, and thus reduce overall travel times.

Add Additional Tracks and Platforms in Heavily Utilized Stations In addition to vehicle design, long dwell times are caused by high passenger volumes, especially at transfer stations. Double tracking could prevent delays and alleviate bunching by allowing a second train to enter the station while the first is still loading. Double tracking already exists at Park Street Station, where there are two through tracks on the westbound side, and at Kenmore.

Upgrade the Signal System Upgraded Green Line signalization could improve the flow of surface cars into the Central Subway and allow for better monitoring of service in the subway. This could also allow a central control center to track problem vehicles and make subsequent adjustments to maintain service.

Signal Pre-emption on Surface Branches Green Line service on the B/Boston College, C/Cleveland Circle and E/Arborway branches is slow primarily because of the high number of signalized intersections along each route. Signal pre-emption equipment for LRVs would allow Green Line trains to hold lights green until they pass, or change them from red to green to reduce the amount of stop time.

Bus Service Bus service is affected by traffic congestion and, because of frequent passenger stops, travel times are long. In many cases, local bus trips to downtown Boston from the core area take longer than rapid transit, light rail, or commuter rail trips from suburban locations. Bus and HOV travel times could be made more competitive with single-occupancy automobile travel times by instituting bus/HOV lanes at congested locations. Bus travel times could be improved through the use of signal pre-emption for buses.

Signal Pre-emption on Heavily Patronized, High Frequency Bus Routes As with surface Green Line service, bus service is often slow because of the high number of signalized intersections along each route. Signal pre-emption equipment would allow bus drivers to manipulate traffic signals in order reduce the waiting time for their buses.

Bus/HOV Facilities The construction or designation of HOV facilities usable by buses, vanpools and carpools, would reduce bus travel times by allowing buses to bypass points of congestion.

Commuter Rail Commuter rail travel times could be reduced through a number of actions. These include:

Upgrade Commuter Rail Track and Equipment to Permit Higher Operating Speeds In cases where track conditions limit operating speeds, tracks could be upgraded to permit higher operating speeds. Along some lines, electrification may also be appropriate. The superior acceleration capabilities of electric locomotives, or multiple unit locomotives, would reduce travel times.

Reduce Dwell Times at Stations New rolling stock should be fitted with wider doors to accommodate large numbers of entering or exiting passengers, bulky packages and bicycles. This will allow shorter in-station times. Another way to reduce dwell time is the construction of high platform at commuter rail stations.

Double-Track Commuter Rail Lines The double-tracking of single track lines would permit greater operating flexibility. It would help to avoid conflicts with freight traffic, allow for more frequent service

including closely spaced express and local trains, and permit greater reverse direction service. It would also alleviate train storage problems at some terminal stations.

Consolidate Commuter Rail Stations Because commuter rail trains accelerate relatively slowly, a large number of station stops results in relatively long travel times. The consolidation of closely spaced stations would reduce the number of stops required and improve travel times. However, consolidation of stations may disrupt existing pedestrian access for commuter rail users in some areas.

Electrification of Commuter Rail Lines Possible electrification of the commuter rail system, presents the opportunity to upgrade the system to an electric regional rail or metropolitan rail system.

Ferry Service Ferry travel times could be reduced by using faster ferry technologies. Examples include hydrofoils, hovercrafts, turbine-powered ferries, and catamarans.

Install Noise Barriers

Sound Barriers could be used to reduce existing noise impacts and to mitigate impacts of new transit and commuter rail projects.

Research Theme: Intermodal Connections

The efficiency of the transportation system as a whole is greatly enhanced by the facilitation of connections between the various components of the system. Intermodal connections allow for an optimal distribution of travelers among the available modes and further allow for each individual trip to be made in the most efficient way. These connections must be available to all travelers, and thus accessibility must be a part of all improvements. Intermodal connections can be improved through a number of types of projects. Examples of types of projects which can improve intermodal connections are listed below:

Improve Roadway Access to Mass Transportation Facilities
Convenient automobile access is necessary for stations with parking facilities and/or large numbers of passengers that are dropped off and picked up. Improvements in roadway access will also help public and private carrier buses, shuttle vans and vanpools. Direct access from major highways, such as at the Braintree and Quincy Adams stations, could attract additional mass transportation ridership. This applies equally well to rapid transit, commuter rail, commuter ferry terminals and express bus terminals.

Construct New Stations on Existing Commuter Rail Lines
New stations on existing lines along major highways, such as Route 128, I-93 and I-495, with direct access from those highways could function as interceptor lots for commuter rail. To be most effective, these facilities would need direct roadway connections to and from the highways. All stations whether in inner suburbs or along major highways, should provide access for pedestrians, bicyclists and buses. When road access is from a limited-access highway, these stations should also provide pedestrian and bicycle access from local neighborhoods.

In urban core and inner suburban areas, new commuter rail stations could be built adjacent to existing rapid transit stations or at major bus boarding areas such as at Riverside, Alewife, JFK/UMass, Ruggles (expansion of existing commuter rail facility) and Newton Corner. This would allow for transfers from commuter rail to other modes as well as serve the employment centers within walking distance of these stations.

Improve Shuttle Bus Connections and Access to Stations
In some high employment areas that are not directly served by transit, private companies provide employees shuttle bus service to and from MBTA transit stations and other locally-based transit services. Examples include the Longwood Medical Area, the Charlestown Navy Yard, the East

Cambridge area between Kendall Square and Lechmere and suburban employers along Route 128. Some of these shuttles are operated through TMO, while others are operated directly by employers. Improved access to stations by shuttle buses could improve travel time and increase public transit usage.

Provide Better Bicycle and Pedestrian Facilities

Better bicycle and pedestrian facilities would encourage greater use of these modes. This could be done by expanding the existing bicycle route network, improving existing routes, and constructing new transportation facilities so that they are conducive to bicycle use. Walking can be encouraged by creating pedestrian zones, and constructing new developments so that they are conducive to walking. Underground connections between subway stations, as well as building to building connections, would further encourage transit usage. In addition, other suggestions are:

- Provide more bicycle racks, or bicycle lockers, at stations.
- Create more South Shore Bikeways.
- Designate a bicycle lane on Cambridge Street between the Longfellow Bridge and Tremont Street and repave the road.
- Improve bicycle access from Commonwealth Avenue to the Charles River bike path.
- Improve bicycle access to bike paths from the BU Bridge.
- Build a walkway over the Neponset River Bridge.
- Install walk signals on Memorial Drive at Western Avenue and River Street.
- Provide for bicycle and pedestrian access to transit, commuter rail and water ferry stations.

Improve Pedestrian Access to Stations

Many transit riders walk to their local station. Safe and easy access to all stations would encourage more people to walk. Access improvements could include new station entrances, clearly designated crosswalks, or pedestrian overpasses for busy intersections. Pedestrian connections between transit stations in the downtown area would facilitate transfers between transit lines and reduce crowding in the downtown transfer stations.

Improve Bicycle Access to Stations

Safe and easy bicycle access to all facilities would encourage more people to use this means of travel. Secure bicycle racks or lockers are a necessity. When feasible, riders should be allowed to bring their bikes with them. This may require special racks for buses, trains and commuter boats.

Provide Additional Parking at Rapid Transit Stations

Until the recent economic downturn, access to much of the rapid transit system had been constrained by the lack of available parking. Nearly all rapid transit parking facilities were at or over capacity. As the economy recovers, it is expected that demand at many parking facilities will again exceed capacity. The expansion of existing facilities and the provision of new facilities could increase ridership by providing access to those who otherwise would not be able to find available parking. The primary market for rapid transit parking consists of commuters to the urban core who live in the mid-distance suburbs, roughly out to and slightly beyond Route 128.

Provide Additional Parking at Commuter Rail Stations

As with rapid transit parking facilities, the majority of commuter rail parking facilities have been operating at or near capacity. Several stations have undergone recent expansions, but there are many more at which demand exceeds supply. The market for commuter rail parking consists of commuter to the urban core who live ten to fifty miles from Boston. It is vitally important for the sake of mitigating regional congestion and improving air quality that these commuters have the option of parking their cars near their homes and traveling into Boston on the train.

Provide Additional Parking at Commuter Boat Terminals

Commuter ferries have proved to be a popular way to commute to the urban core. Since congestion in Boston Harbor is not a problem, parking at the suburban terminals is the primary constraint on ridership. Expansion of these parking facilities in combination with improved access to the terminals would allow ferry operators to fill their boats with passengers and bring more boats into service if necessary. Provisions should be made to ensure that the terminals are conducive to pedestrian and bicycle use.

Provide Additional Parking for HOV Services

Park-and-Ride lots exist along some highways in the region to serve carpools, vanpools and buses. Lots which are currently filled to capacity could be expanded to allow for additional ridesharing. New parking lots could be constructed at locations which would be convenient meeting points for carpoolers and vanpoolers. Intersections of major highways may be appropriate locations for such facilities. In addition new facilities could be built at major express bus boarding locations, or existing lots that are not fully utilized during the daytime, such as at churches, movie theaters, and shopping centers could be used for commuter parking, with the agreement of the property owners.

Coordinate Parking with Private Carrier Bus Routes

Suburban park-and-ride lots are most successful when they are served by express bus routes. Private carriers currently serve some existing parking lots. New lots could be built in areas convenient to these private carriers.

Research Theme: Urban Core Distribution

Although the urban core is well served by radial transit lines, the distribution of transit riders within the urban core could be improved through new connections between lines or new branches from existing lines. These would include new rapid transit lines or extensions, and new high-frequency electric or diesel bus service. The following list is provided as an example. (See Figure 5-2) Those marked with an asterisk were included in the 1978 PMT.

Blue/Red Line Connector *
The Blue and Red Lines could be connected by extending the Blue Line from Bowdoin along Cambridge Street to Charles Station on the Red Line. This would provide better rapid transit access to the airport from areas south and west of downtown Boston. The majority of the analysis for this project will be undertaken in a parallel study which will be later reintegrated into the PMT process.

Circumferential Line *
The Circumferential Service would consist of initial improved bus service and eventual high capacity service, with a proposed route running from Charlestown to South Station or JFK/UMass via Lechmere, Kendall, Kenmore Square, the Longwood Medical Area, Ruggles, Dudley Square and the South End Medical Area. The intent of the high capacity line would be to connect these areas and to relieve crowding on radial lines. The majority of the analysis for this project will be undertaken in a parallel study which will be later reintegrated into the PMT process.

South Boston Piers Transitway
The Transitway is planned to provide high frequency electric bus service from Boylston Station to the vicinity of the World Trade Center in South Boston via a tunnel. Ultimately, the line may be extended to Boylston Station on the Green Line. The majority of the analysis for this project will be undertaken in a parallel study which will be later reintegrated into the PMT process.

Washington Street Replacement Service *
The MBTA has proposed high frequency transit service along Washington Street between Dudley Square and Downtown Crossing to replace elevated Orange Line service. In the future, this could possibly be extended to Mattapan. A future connection to the South Boston Transitway is also possible. The majority of the analysis for this project will be undertaken in a parallel study which will be later reintegrated into the PMT process.

North Station-South Station Connector *
A connection between North Station and South Station, or more generally between the north side commuter rail lines and the south side lines, would allow for through routing and better downtown distribution of commuter rail passengers. It would also allow for Northeast Corridor Amtrak service to extend to northeastern Massachusetts and northern New England. Options to be studied include a connection of North Station and South Station, a connection from South Station to Logan Airport and a connection from Logan Airport to Chelsea. The majority of the analysis for this project will be undertaken in a parallel study, called the Northeast Corridor Extension, which will be later reintegrated into the PMT process.

North Station Transportation Improvement Project
The project as proposed consists of the relocation of the Green Line between Haymarket Square and Science Park Station. Included in this project is the development of a new combined Green Line and Orange Line station with a connection to the North Station Commuter Rail terminal.

Rapid Transit to Logan Airport
Rapid transit service to Logan Airport would make transit access to the airport easier by eliminating the transfer to Massport shuttle buses. The elimination of the transfer should attract additional transit riders and relieve automobile congestion in the Harbor tunnels. Rapid transit service to Logan Airport could be provided by relocation of the Blue Line, a Blue Line spur, or a new line, possibly through South Boston and under the Harbor to the airport.

Back Bay/Park Square Bus Station
The provision of a bus terminal for MBTA express buses and private carriers in the Back Bay/Park Square area has been suggested. This facility could serve to improve connections for the Back Bay area of Boston.

Brookline Village Connector*
This project is a rail link connecting the D/Riverside and E/Arborway branches of the Green Line near Brookline Village. This would provide additional operating flexibility for both branches.

Expanded Service to the Charlestown Navy Yard
The City of Boston is pursuing major redevelopment of the former Charlestown Navy Yard. Expanded surface and water ferry service between the Navy Yard area and downtown Boston would help encourage this development and provide improved transit connections.

South Bay to Financial District Service

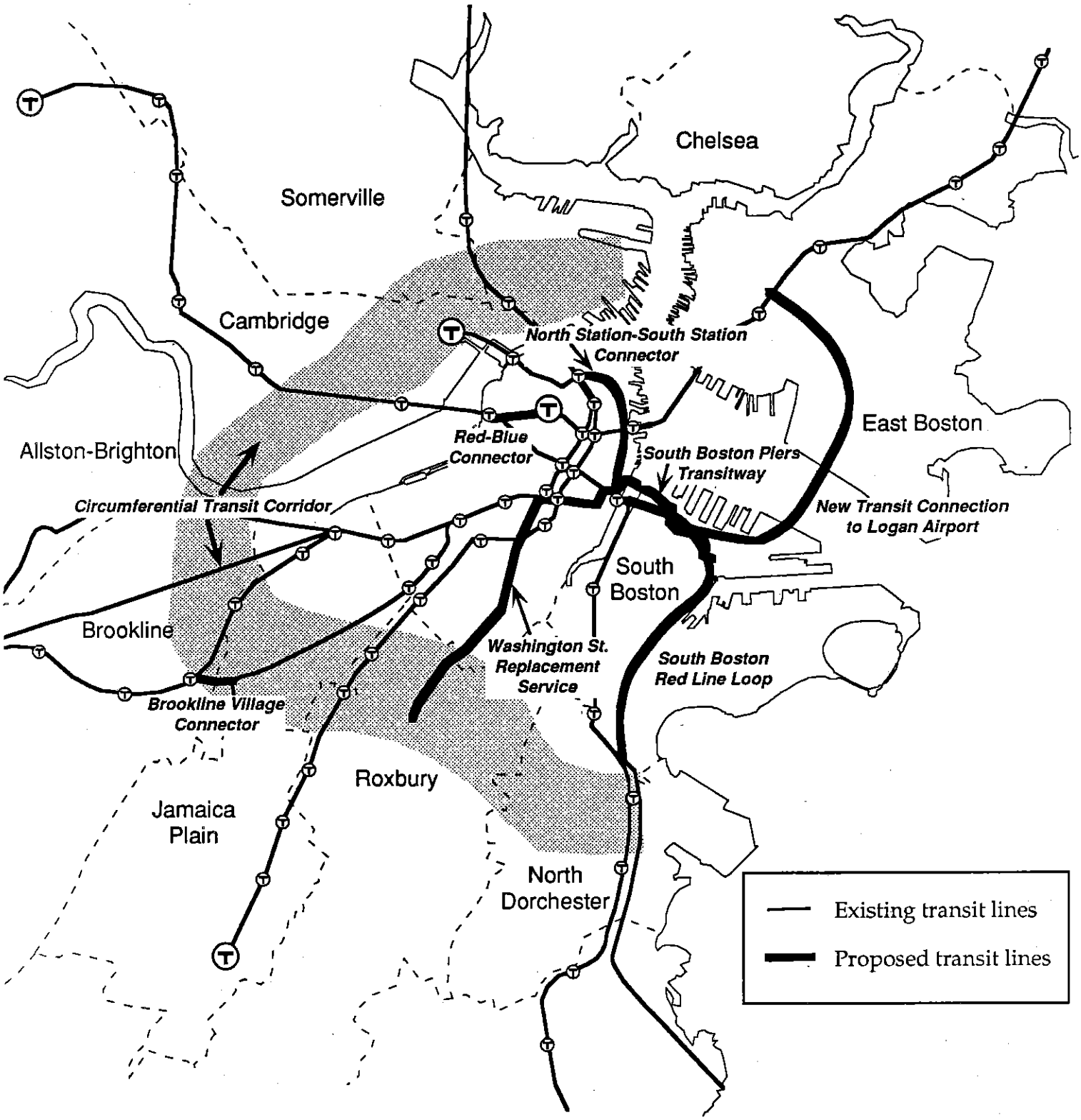
An express shuttle bus service could be instituted from a park and ride lot in the South Bay area near the Southampton Street exit from the Southeast Expressway.

Other

Other potential new services that were suggested are as follows:

- A South Boston Red Line Loop connecting Columbia Road and South Station, via Old Colony Avenue, Dorchester Street and New Congress/Summer streets.
- A new light rail line from the South Boston piers area to the Charlestown Navy Yard.
- A waterfront surface transit line running roughly from South Station to North Station.
- A Red Line subway branch along Mass. Ave. between Central Square in Cambridge and JFK/UMass Station.

Figure 5-2
Potential Urban Core Distribution Projects



Research Theme: New Radial Services

During Phase 1 of the PMT, many proposed improvements to radial transit service to and from the urban core were made. These proposals include suggestions for new services over both long and short distances from Downtown Boston. Although most of these suggestions are for new rail extensions, each will need to be carefully compared with less expensive alternatives. For purposes of the list below, rapid transit service proposals have been listed first, followed by those for commuter rail. Suggestions which are marked with an asterisk were included in the 1978 PMT.

New Rapid Transit Services

Extensions of existing rapid transit lines, or new rapid transit lines, would attract new mass transportation riders by providing direct service to a larger market, and by eliminating a bus/rail transfer for many riders. Examples of potential rapid transit extensions are described below. (See Figure 5-3) Those with an asterisk were in the 1978 PMT:

Blue Line Extension to Lynn * This extension would extend Blue Line service from Wonderland to Lynn. The extension would provide frequent, direct service between Lynn and downtown Boston.

Orange Line North Extension to Route 128 * This extension could extend the Orange Line beyond its present terminus at Oak Grove. Existing commuter rail stations on the Lawrence/Haverhill line between Oak Grove and Route 128 would be converted to rapid transit stations. There could also be a new terminal station near Route 128 for better rapid transit access to riders in the I-93 and I-95 corridors.

Red Line Extension to Route 128 via Arlington and Lexington * An extension beyond Alewife would roughly follow the old commuter rail right-of-way through Arlington and Lexington Centers to a terminal near Route 128. This extension would provide direct rapid transit service to downtown Boston for riders who now must make a bus transfer, as well as better rapid transit access to those from beyond Route 128 in the Route 2 and Route 3 corridors.

Red Line Extension to Waltham An alternative alignment beyond Alewife would be an extension of Red Line service through Belmont to Waltham and possibly Route 128 along the Fitchburg commuter rail right-of-way.

Orange Line South Extension to Route 128 * This could involve an extension of the southern end of the Orange Line beyond Forest Hills to Route 128. This extension would provide direct service from Route 128 to Boston to residents of the Southwest corridor suburban communities.

Red Line Extension from Ashmont to Mattapan This project would extend the Ashmont branch of the Red Line over the alignment of the Mattapan-Ashmont High Speed Trolley Line to Mattapan, eliminating the need to transfer between the High Speed Line and the Red Line at Ashmont. Stations would be combined to improve efficiency at Mattapan, at Central Avenue/Milton and at Butler Street/Cedar Grove. Trains would draw power from overhead catenary for safety at existing grade crossings.

Red Line Extension to Hyde Park If the Red Line is extended from Ashmont to Mattapan, a later phase could extend the line from Mattapan via a tunnel to the Fairmount commuter rail line right-of-way. Trains could continue in this right-of-way to Hyde Park, Readville or beyond.

Green Line D Branch Spur to Newton Upper Falls/Needham Heights This project would extend the D Line from just west of Newton Highlands connecting through Newton Upper Falls to the present terminus of the Needham commuter rail line at Needham Heights. Alternatively, this Green Line extension could terminate at a new garage built on air rights over Route 128 near the Highland Avenue interchange, and the commuter rail line could be extended to either that point, or the Green Line could be extended to Needham Junction, and commuter rail cut back to Needham Junction.

Green Line D Branch Extension to Newton Lower Falls This project would extend service on the D Line from the present terminal at Riverside over the right of way of an abandoned rail line to Route 16 at Newton Lower Falls. This would improve D Line access from Lower Falls and Wellesley and could reduce parking demand at Riverside and Woodland.

Green Line Extension from Lechmere through Somerville to Tufts * Service to Somerville could be increased by extending the Green Line from its existing terminus at Lechmere along the Lowell commuter rail line right-of-way to the vicinity of Tufts University in Medford.

Blue Line Beyond Charles through Somerville to Tufts An extension of the Blue Line from Charles Station across the Charles River to East Cambridge, Lechmere, and Tufts would be an alternative to extending Green Line service from Lechmere to Tufts in Medford.

Blue Hill Ave Rapid Transit Line from Mattapan to Downtown Bus routes operating along Blue Hill Avenue (Routes 28 and 29) are among the most heavily utilized in the MBTA system. Trips to downtown Boston require a transfer to the Orange Line and can take more than 40 minutes. A rapid transit line along Blue Hill Avenue would provide rapid transit service to a densely populated area of Boston. The northern end of the line could also serve either Dudley Square or the South End Medical area with connections to Washington Street Replacement Service. Alternatively, there could be an extension of the Washington Street Replacement Service to Mattapan.

Blue Line to Riverside This line would be an extension of the Blue Line from Bowdoin to Charles Station, along the Esplanade or through the Back Bay to Kenmore Square, and then along the Riverside branch of the Green Line (which would be converted to Blue Line service). This service would provide direct connections from the Fenway, Back Bay, Brookline and Newton to the airport, faster service to downtown from Newton, and would relieve crowding on the Green Line.

A variation would extend the Blue Line from Government Station to Park Street then under the Boston Common Garage and the Public Garden to Arlington Station with a Boylston Station pedestrian connection. The new Blue Line would continue west under Newbury Street to join the Green Line at Kenmore and then continue on via the D Line to Riverside.

Orange Line to Riverside A connection of the Green and Orange Lines east of Fenway Park by using the former Highland branch. The Orange Line would extend to Riverside.

Red Line to Brighton A new west corridor rapid transit service could be built to Brighton Center sharing Framingham Line commuter rail tracks to Allston with a new underground track to Brighton.

Restoration of Green Line Service to Oak Square * This potential project would involve restoration of Green Line service along the old A branch from Packard's Corner through Union Square and Brighton Center to Oak Square. Service would be restored to many of the most heavily utilized portions of the old A branch while avoiding the traffic problems involved in restoring service all the way through Newton Corner to Watertown Square.

Restoration of Green Line Service to Arborway MBTA planning for restoration of Arborway Green Line service from Heath Street to Forest Hills is underway. Service is proposed to be restored along Center Street

in Jamaica Plain, providing improved rail connections with the Orange Line, one seat service to downtown Boston, and improved service to the Longwood Medical Area.

Conversion of the Fairmount Line to Rapid Transit The Fairmount commuter rail line operates through densely developed areas of Mattapan and Dorchester between Readville and South Station.

Blue Line to Peabody This project would extend Blue Line service, from Wonderland in Revere along the Rockport/Ipswich right-of-way, to Salem Depot and westward to the Peabody/Danvers Area, a proposed concentrated development and transportation center bounded by Route 114, Route 1 and Route 128. Another alternative would be a bus option to run along this right-of-way.

Orange Line to Peabody This project would extend Orange Line service from Oak Grove in Malden to the Peabody/Danvers area via Wakefield and Lynnfield. Another alternative would be a bus option to be run along this right-of-way.

New Commuter Rail Services

Extensions of existing commuter lines, as with rapid transit, would attract new mass transportation riders by providing direct service to a larger market. New riders served would be those that now do not have nearby transit service, most of whom currently drive to the urban core or to commuter rail and rapid transit stations. The implementation of new lines would fill in gaps in the existing service where there is not any present rail service or where service is inconvenient. Examples of potential new commuter rail or express commuter bus services are described below. (See Figure 5-4)

Worcester Extension This extension would restore service from Framingham along an existing right-of-way to Worcester. Options considered include a segment to Milford near I-495/Routes 16 & 109 and to Marlborough near I-495. This extension is the subject of a parallel planning study, Commuter Rail: Worcester Extension.

Lowell to Nashua/Manchester Extension This extension would extend the Lowell Line service to Nashua, New Hampshire and help relieve traffic on Route 3. Service could also be extended to Manchester, New Hampshire.

Natick to the Route 30 and Speen Street Intersection This proposal would extend to the Shoppers' World area in Framingham and Natick. A potential transportation center could be constructed at the terminus of the line.

New Bedford/Fall River This project would extend passenger service from the end of the existing Stoughton branch to the cities of New Bedford and Fall River. This extension is the subject of a parallel planning study, New Bedford/Fall River Commuter Rail Restoration Project.

Franklin to Bellingham and Milford Extension This project would extend the Franklin Line beyond Route I-495 to Bellingham with a station in the vicinity of Route 126, and to Milford with a station near Route 16.

Newburyport-Portsmouth Extension This project would be a further extension of the Ipswich line from the proposed Newburyport station to New Hampshire seacoast communities including Seabrook and Portsmouth. It would involve upgrading of active and abandoned MBTA and Guilford tracks to passenger service standards.

Newburyport-Amesbury Extension This project would be a further extension of the proposed Ipswich line via an abandoned rail line to a new park and ride facility in the area of I-95 and I-495 near the Salisbury-Amesbury town line.

Other Commuter Rail Extensions In addition to the above, there are a number of other possible new commuter rail services and extensions:

- A loop connecting South Station, Logan Airport and Chelsea Station (on the Ipswich/Rockport Line).
- Service on the Lynnfield/Peabody Spur.
- Service on the Saugus Branch between Everett Junction and Cliftondale.
- Restored service to Berlin via Wayland on the Central Massachusetts Branch.
- Service to Wakefield, Lynnfield, Danvers, and Topsfield.
- Service to Millis.
- Service to Watertown.
- Extension of the Haverhill Line to Rosemont.
- Service to Foxboro and Mansfield (a spur off of the Franklin Line from Walpole).
- Connect the Fitchburg and Framingham lines near Route 128.
- Service to Salem, NH.
- Service to Springfield.
- Service to Taunton

Figure 5-3
Potential Rail Extensions

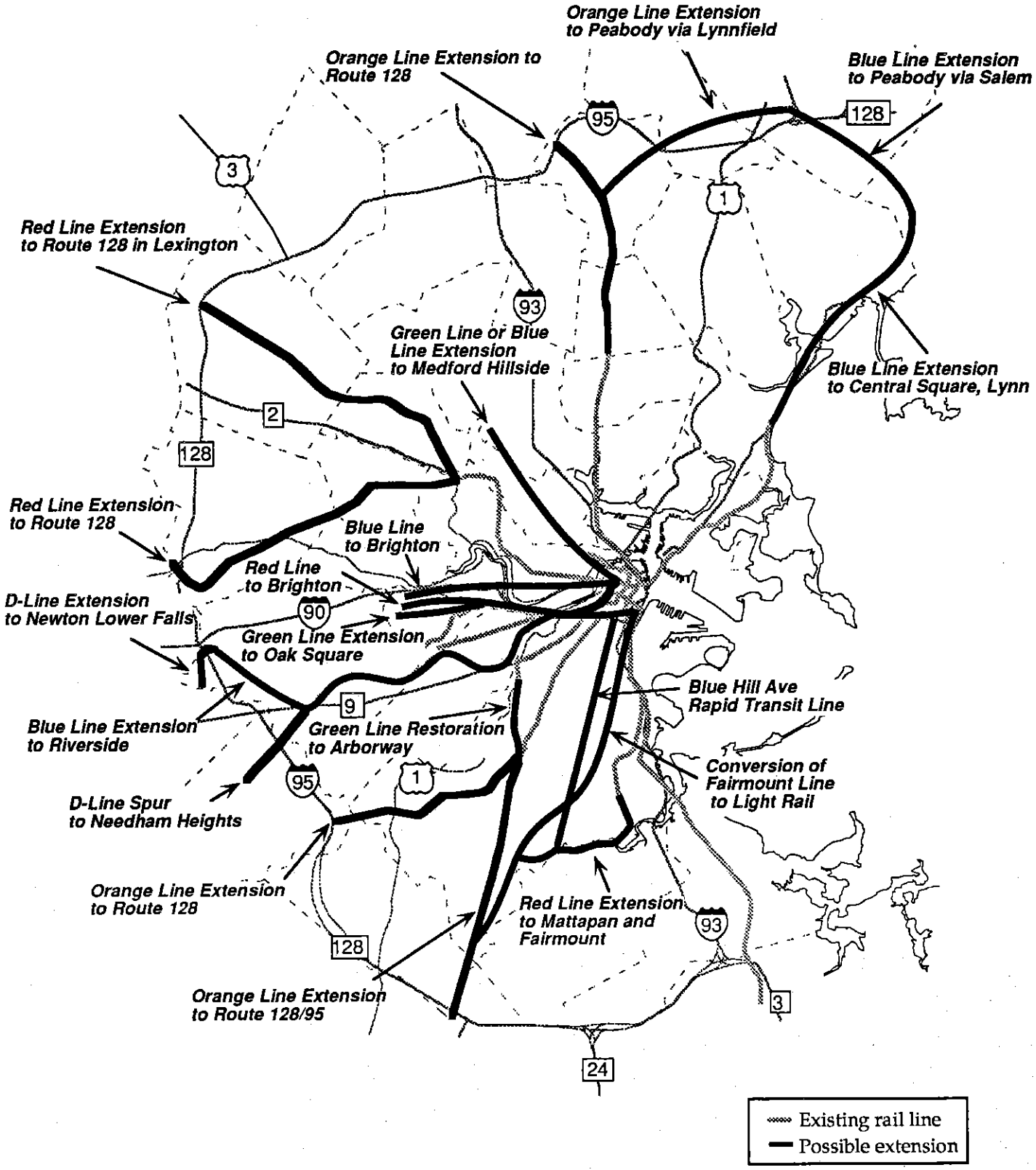
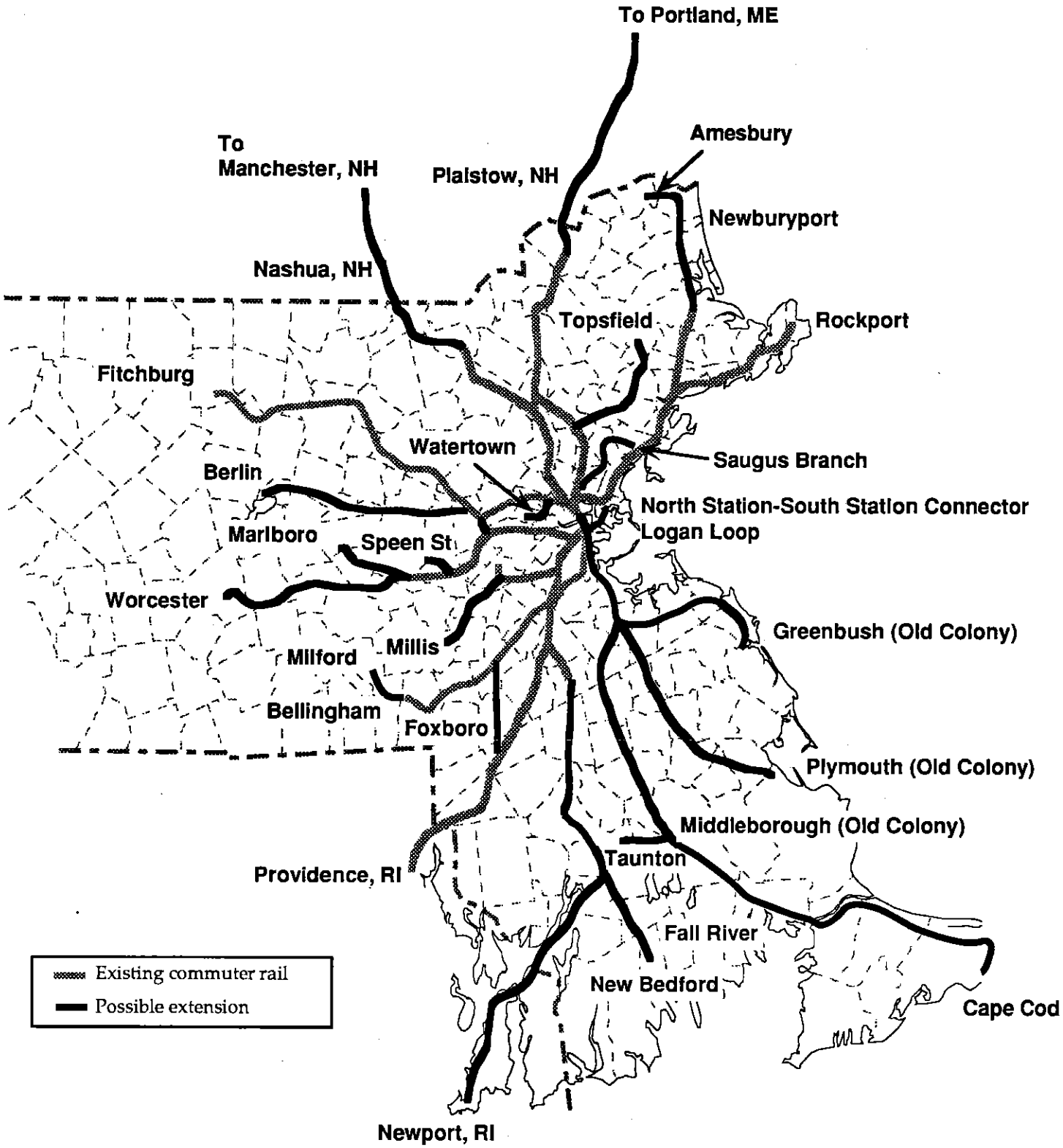


Figure 5-4
Potential Commuter Rail Extensions



Research Theme: Suburban Circumferential Movement

The number of trips being made in suburban areas, especially between suburbs, has dramatically increased over the past few decades. Transit services not destined for the urban core have expanded only gradually, due to the great dispersion of both origins and destinations of suburban trips. Since it appears that suburban circumferential movement will continue to increase significantly, it is appropriate to explore the potential for new services.

Route 128 Circumferential Transit

The extent of traffic volumes and daily congestion along Route 128 has led to many suggestions for alleviation by increasing travel options. The vast scale of the changes in land uses along Route 128 suggest the existence of a fringe city which is worthy of a variety of transportation services. However, present transit ridership along the route is limited to virtually only those trips which use Route 128 as a portion of the route into Boston. Ridesharing trips in the corridor are a stable portion of traffic volumes, but a portion which many hope to increase as an option which can attract more riders.

Bus or rail service along Route 128 has frequently been proposed to increase transit ridership along the Route 128 corridor. The difficulty with large-vehicle transit solutions on Route 128 has, in the past, been the widespread dispersion of both origins and destinations. Although a greater concentration of destinations along the corridor has occurred over the past ten to twenty years, the density of resulting trips has seemingly not yet reached a level comparable to the urban core. A closer look is warranted, based on recent census data and adjusted for current and forecasted economic conditions.

Circumferential Movement between Suburban Centers

All of the suburban circumferential movement which may need to be accommodated cannot be diverted to Route 128. A substantial amount of existing circumferential movement occurs between older suburban downtowns, stable residential areas and the newer commercial centers and residential developments. Part of this movement is accommodated presently by existing local bus services, but these services are frequently limited by town boundaries.

New transit or ridesharing services may be possible to accommodate the existing and latent travel between suburban centers. To explore such services it will be important to examine those centers which demonstrate good potential for both internal growth and for external markets.

Development of New Suburban Transportation Centers

At present, most existing suburban park and ride facilities serve only one mode. However, the addition of new modes and services could serve to create transportation centers that would serve as hubs for suburban transit and ridesharing. Expanding the number of options travelers have provides benefits in that travelers do not have to rely on the same mode for a return trip and thus have fallback travel options in case of personal emergencies.

Transportation services that could be provided at transportation centers include:

- Private bus services to the urban core
- MBTA radial services to the urban core
- MBTA local bus service
- Local suburban services
- Private shuttles to employment centers
- Private intercity bus service
- Staging areas for carpools and vanpools
- Logan express buses

The development of transportation centers would provide a hub and spoke type system that would allow a greater number of trips to be made with only one transfer. By combining services at a single location, a higher level of service could also be provided. Transportation centers would also provide a high profile location for connections between MBTA and other services, which would increase public awareness of both types of services.

New transportation centers could form a base for selecting services by the most effective mode of transportation For example, trunk line service and connections between transportation services could be provided by the MBTA or private carriers, while connections to residential areas could be provided by community-operated services, and connections to employment centers could be provided by private employers and/or TMOs.

Use of Existing Suburban Downtowns as Transportation Centers

Transportation centers may be effectively integrated with services that commuters utilize on the way to or from work. These include convenience stores, cleaners, video rental stores, and daycare.

Many suburban downtown areas already have these services as well as a significant amount of transit service. Development of some downtown locations into transportation centers could attract new business to downtown areas and provide added convenience to commuters. Potential locations should include larger downtown areas that already have MBTA service and would be suitable for expanded parking.

Research Theme: Regional HOV System

High Occupancy Vehicles (HOVs) have become the focus of a great deal of attention as a means of expanding the person-carrying capacity of existing or new highway facilities. HOV lanes on expressways are commonly discussed and there is potential for such lanes on major arterials used by buses. Preferential treatment for HOVs in parking facilities, approach ramps and toll locations is also being explored as a means to encourage ridesharing and bus ridership.

Radial HOV Facilities on Expressways

For trips between the suburbs and the urban core, there are a number of potential locations for bus or HOV lanes. These HOV facilities would provide travel time savings to carpools, vanpools, and buses that would make these services more competitive with single-occupancy automobile travel. A number of HOV facilities designed to link existing and new population and employment centers are proposed in MAPC's "MOVE" network.

The major expressways which provide radial service into the urban core are the Southeast Expressway, the Mass Turnpike and I-93 north. HOV facilities on each of these between Downtown Boston and Route 128 are to be examined for feasibility as part of other parallel planning studies; the results, when available, will be useful input to PMT discussions.

Radial HOV Facilities on Arterial Routes

Providing special facilities for HOVs on arterial routes can be a useful method of bypassing trouble spots or locations which are congested. They can also be used as a method of promoting alternatives to single-occupancy vehicles. Many of these locations will be found in the urban core areas leading toward Downtown Boston or Cambridge. Examples which have been suggested include:

- On Rutherford Ave, through City Square and on the Charlestown Bridge.
- On Washington Street in Roxbury, the South End, and/or downtown Boston.
- On Tremont Street in the South End and Roxbury.

Circumferential HOV Facilities

HOV facilities have frequently been suggested as a means of decongesting major highways such as Route 128. There is a need to examine patterns of congestion to determine if implementation of HOV lanes can be effective in relieving traffic There is a parallel and important need to ascertain the

demand for HOV lanes as a new transportation option - particularly in those areas which are not presently well-served by transit or HOV alternatives to single-occupant vehicle use.

Circumferential highways and arterials which are seriously congested in whole or in part should be examined to determine if there are locations where provision of HOV lanes can be a useful method of relieving congestion or providing new travel options.

Core Area HOV Facilities

Within the urban core area, there are a number of potential locations for HOV facilities. Suggested facilities, which would provide travel time savings to carpools, vanpools, and buses, include:

- Non-stop passage through tolls at Mass. Pike, Sumner/Callahan Tunnel and Tobin Bridge
- HOV access roads to and from new Third Harbor Tunnel

Core and Suburban HOV Facilities

There are a number of suggestions to improve the incentives for HOV users, these include:

- Head of Queue privileges.
- Preferential parking in parking garages and lots located throughout the core to provided convenient and assured parking for HOV riders.

Research Theme: Transportation Demand Management

One method of dealing with traffic congestion has been to alter the character of the demand for movement, both during the peak commuting hours and in less congested times. In recent years there have been many alternative methods put forward to increase the use of transit by positive reinforcements and incentives, as well as improvements in making transit more available and understandable. In addition there have been suggestions that basic patterns of land uses, which are closely linked with transportation demand, may need to be examined for potential redesign in dealing with future traffic and transit demand.

Land Use/Zoning Requirements

Future development can be made more compatible with ridesharing and transit through zoning requirements and approval processes. MAPC's MetroPlan 2000 is an example of how this could be done. In general, "sprawl" development should be discouraged, higher density should be encouraged, and new development should be designed to encourage use of mass transportation. Also, there should be a balance between jobs and housing to reduce trip lengths.

Provide Better Public Information

Better public information could be provided to improve ease of use and encourage use of the system by infrequent riders:

- Train operators should make more/better announcements .
- Improve public announcements in stations.
- Make system maps and schedules more widely available—at all stations and on all buses and commuter rail trains, and elsewhere. Also make sure this information is always available not just after schedule changes.
- Improve marketing to make people more aware of available services (MBTA and other).
- Provide better signage at Government Center Station directing passengers to continuing service to North Station, Lechmere and Logan Airport.
- Create better awareness of paratransit services .
- Provide more convenient schedules for reverse commuting.
- Provide more signage directing automobile drivers to transit stations.
- Use electronic signs to provide service and schedule information.
- Use electronic announcements, tactile stripping, tactile signage, voice mail information services.
- Make sure information signs are up-to-date and accurate.
- Improve telephone information system.

Incentives for Ridesharing and Transit Use

Incentives for mass transportation usually involve cost and service, and can take a number of forms. Incentives to make multi-occupant vehicle options more competitive with single occupancy vehicle travel include:

- Free or reduced parking fees at private and public lots. Free or reduced parking for carpools and vanpools could be required at public and private lots though approval and licensing processes.
- Free or reduced parking fees at MBTA stations. More efficient use of MBTA lots could be encouraged by providing free parking to those entering in carpools and vanpools. Where parking supply is limited, "lost" parking revenue would be offset by additional fare revenue.
- Preferred parking in public and private garages and surface lots.
- Free or reduced passage through tolls to provide a financial incentive to ridesharing.
- Express lanes through toll booths to provide a time-saving incentive to ridesharing.
- Development of HOV facilities (as described above).
- Guaranteed ride home programs that would allow those that participate in ridesharing program or use peak-period-only transit services a way to get home in case of personal emergencies.
- Lower transit fares to provide a greater incentive for transit use.
- Tax incentives to provide a greater incentive for transit use. This would include equalizing the federal tax deduction for employer provided parking and transit benefits.
- Increased car insurance deductions to provide a financial incentive.

Other economic and institutional incentives that would likely make mass transportation more attractive compared to single-occupancy vehicle travel include:

- Increase or implement gas, excise, and/or parking taxes.
- Increase and/or implement new tolls.
- Require parking charges at all non-residential locations.
- Congestion pricing to charge for automobile use by time of day.
- Explore use of pre-paid toll collection on the Mass Pike.
- Restrict parking. This can be done through approval and licensing processes, as well as through the implementation of parking freezes.
- Implement a pass system for access to Boston.
- Trip reduction ordinances to limit trip generation from developments.

Appendix A
Operations-Related Projects

Many of the improvements proposed in the Phase 1 public input process were operational in nature. Operational projects that have capital implications will advance to Phase 3 for analysis. Projects that are purely operational in nature will be addressed by the MBTA Operations Department, or other responsible parties, outside of the PMT process. This appendix lists those projects.

Systemwide

Improve Accessibility The Americans with Disabilities Act (ADA) requires all public transportation facilities to be made accessible to those with disabilities. Further, the system should also be made "user-friendly" to those with disabilities. Most ADA-related improvements are capital in nature. Operational issues were as follows:

- Operate accessible bus service parallel to the Framingham commuter rail line until it is made accessible.
- Connect the MetroWest paratransit system with the MBTA's core area system.
- Expand The RIDE service to Needham.

Provide Better, More Reliable, More Secure, and More Convenient Mass Transportation Facilities and Services Mass transportation facilities should be well maintained and service should be reliable. Specific comments were received on the following:

- Increase visibility of MBTA security and police.
- Allow passengers to board MBTA buses at terminal location before beginning of trip (especially in inclement weather).

- Provide better coordination among private transit operators and the MBTA.
- Encourage bus drivers to be friendlier.
- Provide better security at Lynn Station.
- There should be more starters and better security at Haymarket Station.
- Security should be improved at Andrew Station.
- Place bicycle parking in more visible locations for added security.

Lengthen Hours of Operation and Increase Service Levels MBTA services could be operated longer hours to provide additional mass transportation travel opportunities. Specifically:

- Operate service 24 hours.
- Begin service earlier in the morning.
- Operate more evening and weekend service.
- Provide more frequent bus service.
- Provide south side commuter rail service on Sundays.
- Provide more service on MBTA bus routes 87 and 88.
- Provide more Saturday and Sunday service on Route 93 to the Charlestown Navy Yard.
- Provide more late night bus service between Winthrop and Orient Heights.

Red, Orange and Blue Line Service

Reduce Headways Service is frequent during most times; as a result waiting times are relatively short. However, some reductions in travel times could be achieved by operating more frequent service (which may or may not require capital improvements).

Open All Station Entrances Reopening closed station entrances would make transit usage more convenient and accessible.

Green Line Service

Operate More Green Line Service to Lechmere At the eastern end of the Green Line, E/Arborway trains operate through to Lechmere at while all other Green Line trains turn back at either Government Center or North Station. This turning back of service reduces operating costs but often creates bunching of trains and delays. The operation of all trains to Lechmere would provide additional operating flexibility to reduce bottlenecks, delays, and the operation of consecutive outbound trains to the

same branch. It would also provide additional service between Government Center and Lechmere, and reduce the need to transfer between Green Line branches.

Analyze Operational Changes Operating improvements may be possible within the constraints of the existing system by:

- Coupling single car trains into two or three car trains before entering the subway.
- Operating three car trains at all times on all lines.
- Revising the fare collection system to allow use of all doors for surface service.

Operate Connecting Green Line Service Between the D, C and B Lines Allowing Green Line vehicles to run on existing track along Chestnut Hill Ave at Cleveland Circle, light rail riders would be able to make a one-seat cross-town trip between Brighton/Allston, Brookline and Newton. Presently, riders making these trips must either walk between lines or transfer at Kenmore Square.

Bus Service

Implement Timed-Transfer Points Between Buses at Major Transfer Points Bus service can be scheduled to reduce the amount of wait time between trips. To do so most effectively, service should be coordinated between routes with the highest transfer volumes and at major transfer stations. Transfer volumes between routes will be determined by the MBTA systemwide passenger survey. Transfer stations with a large number of connecting bus routes include:

- Ruggles
- Harvard Square
- Forest Hills
- Wellington
- Malden Center
- Watertown Square
- Medford Square
- Sullivan
- Davis
- Dudley Square
- Quincy Center
- Central Square, Lynn
- Newton Corner
- Central Square, Cambridge

Limited or Express Service on High Ridership Bus Routes Travel times could also be decreased by operating limited or express service on high ridership routes. Limited service would stop at only certain designated stops, while express service would operate non-stop from a certain point. Candidate routes include:

- Route 1 between Harvard and Dudley Square.
- Route 49 along Washington Street in Roxbury and the South End.
- Route 39 along Centre Street in Jamaica Plain.
- Route 57 along Washington Street, Cambridge Street and Brighton Avenue through Brighton.
- Routes 28 and 29 on Blue Hill Avenue and Warren Avenue in Roxbury.
- Route 66 between Union Square, Allston and Ruggles.
- Routes 71 and 73 along Mount Auburn Street in Cambridge and Watertown.
- Route 32 along Hyde Park Avenue in Jamaica Plain and Hyde Park.
- Route 34 along Washington Street in Jamaica Plain and Roslindale.
- Route 70 along Arsenal Road in Watertown.
- North Shore Express Routes between downtown Boston and Lynn (Routes 400, 440, 450).
- Routes 80, 89, and 101 along Broadway in Somerville.
- Route 111 through Chelsea.

Hold Buses for Arriving Trains For trips to the rapid transit system, well timed connections are largely unnecessary because of frequent rapid transit service. In the opposite direction, however, disembarking rapid transit riders are often transferring to infrequent bus service. To improve these connections, buses can hold for a certain amount of time to allow passengers to transfer. This can be done by installing signals at rapid transit stations (such as flashing beacons) that inform bus drivers that a train is approaching the station, and to delay departure until the passengers have transferred.

Better Feeder Bus Service In addition to providing one-seat rides to downtown Boston and other urban core destinations, private carriers and MBTA bus routes offer feeder services to rapid transit and commuter rail. Feeder bus services are most efficient when wait time between transfers is minimized. Among the busiest rapid transit stations are Alewife, Harvard Square and Ashmont stations on the Red Line, and Malden Center, Wellington, Forest Hills and Ruggles on the Orange Line. On commuter rail, better connections at Salem and Newtonville stations would improve overall travel time.

Allow Passengers to Board Buses Before Departure Most buses layover at terminal locations between trips, and passengers are not usually allowed on-board during the layover period. Passenger comfort and convenience would be improved if they were allowed to board before departure time, especially during inclement weather.

Combine or Through-Route Local and Express Routes In areas where there is a high degree of transferring between local and express routes, transfers

can be eliminated by either combining local and express routes into single routes or through routing some local buses. By doing this, passenger convenience is maximized while at the same time minimizing overall trip time. Locations where this is already done, but where additional improvements may also be possible, are in Waltham, Newton the North Shore and Medford.

New Express Bus Routes Express bus services can be implemented relatively inexpensively and can provide a high level of service. As with other services, park and ride lots designed for new services should provide convenient access from major roadways. The following are potential new express services (See Figure A-1):

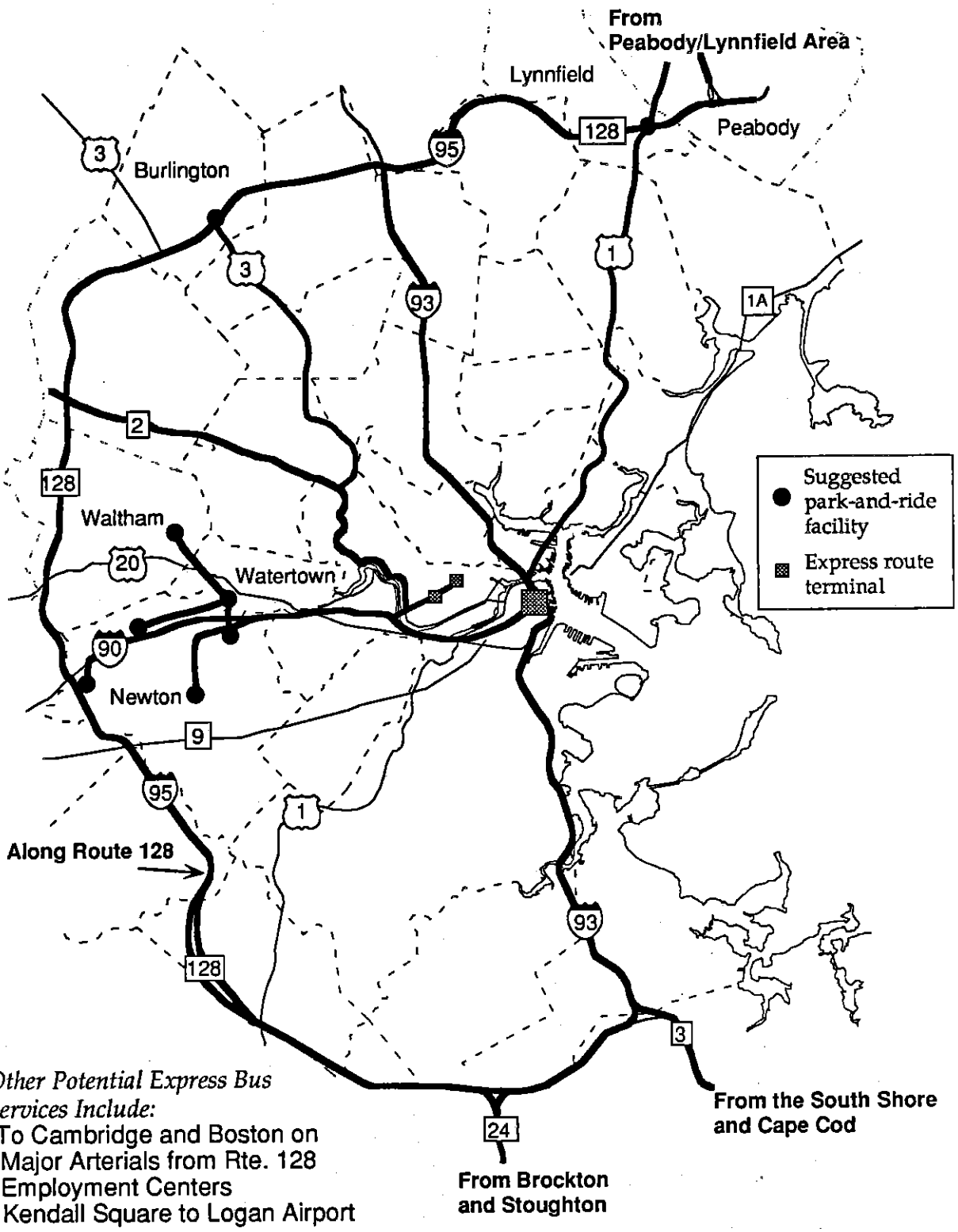
- Peabody/Lynnfield/Saugus to Haymarket/Downtown Boston
- Newton Centre – Back Bay/Financial District
- Express service on Route 128
- Expanded express service to South Shore (expanded P&B and Carey's service)
- Brockton/Stoughton – Boston via a Southeast Expressway HOV lane
- Cape Cod – Braintree Station
- Riverside to Central and Kendall squares via I-90
- Express buses to Kenmore Square
- Express buses from high employment areas on Route 128 to downtown Boston, Kendall and Central squares in Cambridge, and Kenmore Square
- Kendall Square to Logan Airport
- Express buses to the New Market/South End Medical Area
- Express buses from Riverside to Harvard Square
- Express buses from I-93 (North) to Cambridge

New Airport Express Bus Services New airport express bus services could be instituted from:

- Woburn
- Alewife
- The North Shore
- Kendall Square in Cambridge

Expansion of Town-Operated Systems Most community-operated systems operate minibus services that are better suited to the lower demand levels of intra-suburban travel. Use of these services may be a more cost-effective means of expanding suburban transit service than by providing additional MBTA service. Communities with local transit services include Bedford, Beverly, Burlington, Dedham, Framingham, Natick, Norwood, Lexington and the Mission Hill neighborhood of Boston.

Figure A-1
New Express Bus Routes



Other Potential Express Bus Services Include:
- To Cambridge and Boston on Major Arterials from Rte. 128 Employment Centers
- Kendall Square to Logan Airport

Improve Integration of Town-Operated Services Most existing town operated services operate within the boundaries of a single community, which means that inter-community trips require (a) transfers at town boundaries or at inconvenient locations, and (b) the payment of two fares. For adjoining towns with locally-operated services, some trips could be combined into inter-community routes that provided more direct and more convenient service to residents of both communities. This type of service coordination could also be applied to locally-operated paratransit programs.

Improve Integration of MBTA Local Services and Privately Operated Local Services Integration of MBTA and private operator systems could be improved by (a) coordinating local system trips with MBTA trips, (b) creating transfer stations to facilitate trips, and (c) allowing the use of MBTA passes on local systems and/or the development of a new joint pass. Candidate routes for improved integration include Milford to Framingham and Hopkinton to Framingham, both operated by the Town of Framingham.

Improve Integration of MBTA and Private Carrier Services In addition to the MBTA and other transit authorities, a number of private carrier bus companies operate in eastern Massachusetts providing both local and express services, some subsidized by the MBTA. Service could be improved by (a) coordinating private carrier and MBTA services, (b) creating new transfer stations, (c) allowing the use of MBTA passes on local systems and/or developing a new joint pass. The MBTA or regional TMOs could lead coordination efforts.

Provide Better Circumferential/Crosstown Bus Service While most existing bus service is radial in nature, improved MBTA provided circumferential or crosstown service would increase suburb-to-suburb transit travel opportunities.

Increased Shuttle Bus Services In some high employment in Boston and suburban areas on Route 128, private companies working together in TMOs provide employees shuttle bus services to and from MBTA transit stations and other locally based transit services, as well as service to neighboring office parks. Where service is feasible, private companies and the MBTA could work together to improve transit accessibility to urban and suburban job sites. For example, a shuttle bus connecting Canton Center and Canton Junction commuter rail stations to Canton Corporate Center would provide reverse commuters a public transit option. Urban locations currently served by shuttle bus service include Ruggles Station and Kenmore Station.

Other Suburban Improvements In addition to the above, specific comments were received on the following:

- Provide bus service between Burlington and Mishawum Station.
- Increase service frequency on Route 439 between Nahant and Lynn.
- Resume weekend service on Route 439 between Nahant and Lynn.
- Reinstate bus service along Route 138 between Canton and commuter rail stations.
- Institute summertime weekend service from Braintree Red Line Station to Nantasket Beach in Hull.
- Institute a pilot subscription bus program for shift workers.
- Run through bus service between Hull, Quincy and the South Shore Plaza to serve transit dependents, students and the elderly.
- Provide better bus service to Waverly Station.
- Coordinate MBTA bus service with Plymouth & Brockton service.
- Improve the reliability of Route 9 bus service (Route 60).
- Reroute Route 52 across from Rachel Road in Dedham.

Commuter Rail Service

Increase Commuter Rail Service Service levels can be increased by operating more evening and weekend service. Specific comments were received with respect to increasing early morning, evening, weekend, and holiday commuter rail service, and to operating south-side commuter rail service on Sundays:

- Run all Needham Line trains through to Needham Heights.
- Add another peak hour train to the Attleboro Line.
- Operate more commuter rail service to Lynn.
- Operate more commuter rail service to Littleton.
- Operate more commuter rail service on the Framingham Line.
- Operate a Beverly shuttle.

Run Express Trains Travel times could be reduced by operating more express trains during peak periods on more lines. Specific comments were received with respect to operating express trains on the Haverhill Line, the Ipswich and Rockport lines, and the Fitchburg Line.

Operate Service to Rated Speed to Track and/or Equipment In some areas, trains could be operated at higher speeds on existing track. Where station spacing permits, travel times could be reduced by operating service at the maximum speed possible.

Operate Skip Stop Service Reductions in overall travel time can be achieved by allowing trains to skip over particular station stops on certain runs. By not making all stops on all runs, faster service can be provided.

Commuter Boat Service

Provide Better Connections to and from Ferry Terminals There are few transit connections available to ferry boat riders. Direct bus connections at both ends of ferry services, particularly the downtown Boston end, could improve ridership. This would include, but not be limited to, better bus connections with ferries at Hingham, and feeder bus service to and from ferries at Rowes Wharf.

Miscellaneous

- Operate substitute bus service during times when commuter rail does not operate.
- Provide better distribution service from commuter rail in downtown Boston, Ruggles Station and the Back Bay.
- Explore additional terminal locations, such as Back Bay, Copley Square or Cambridge, for express commuter bus operators.
- Extending routes for express commuter bus operators so passengers would not have to transfer to arrive at destinations in Copley Square, Back Bay or Cambridge.

Appendix B
Parallel Planning Studies

The following projects will be evaluated in light of planning studies that have been or will be completed by the state or federal agency listed. When a planning study listed here has sufficiently defined the demand for, benefit of and capital implication of the proposed project, those results will be incorporated into the Phase 3 PMT evaluation process.

- **MBTA Fare Increase EIR**
  MBTA Revenue and Service Environmental Impact Report, Currently in progress by the MBTA

  The study of environmental and socioeconomic impacts of the 1991 MBTA fare increase.

- **MBTA Comprehensive Fare Plan**
  MBTA Comprehensive Fare Plan, Currently in progress by the MBTA

  A document consisting of (1) a statement of MBTA fare policy, (2) a plan for a new/adjusted fare structure (3) a plan indicating how and when fare increases will occur, taking into consideration issues of efficiency, ridership and revenue.

- **Options for Future Fare Collection Equipment**
  Options for Future Fare Collection Equipment, Currently in progress for the MBTA by J.W. Leas, Inc.

  A study to evaluate the various types of fare collection equipment for use throughout the system.

- **Metroplan 2000**
  MetroPlan 2000: The Regional Development Plan for Metropolitan Boston, by Metropolitan Area Planning Council. May 1991.

  This document outlines the long-term regional development plan for Metropolitan Boston, which has as its goal promoting economic development in an efficient, safe and well planned manner. The basic tenet of the plan is that concentrating development is economically and environmentally more beneficial than the current pattern of scattered growth. The document includes a Transportation Element which presents recommendations designed to reverse trends towards long commutes, reduce reliance on the single occupant vehicle and improve options for auto-free commuting.

- **Bowdoin/Charles Connector Project**
  Preliminary Design and Environmental Studies Status Report, by Howard Needles Tammen and Bergendoff/ Thomas K. Dyer, Inc. November 1987

  The proposed project involves establishing a link between Bowdoin Station on the Blue Line and Charles Station on the Red Line. This report includes all technical reports completed up to the point at which the MBTA put design work on hold (summer 1987) in order to perform alternatives analysis and seek funding from the Federal Transit Authority (Formerly UMTA).

- **Commuter Rail: Worcester Extension**
  Commuter Rail Extension Feasibility Study: Framingham to Worcester, Milford, and Marlborough, by Stone and Webster Civil and Transportation Services, Inc. January 1990

  The MBTA is studying the extension of commuter rail services to Worcester. This project includes the refurbishment of track and bridges on this right-of-way. All services will be accessible. Options considered include restoration of an existing 22.9 mile long segment to Worcester near I-290, a 12.3 mile segment to Milford near I-495/Routes 16 & 109, and a 10.3 mile segment to Marlborough near I-495.

- **Old Colony Railroad Rehabilitation**
  Final Environmental Impact Statement/Report: Old Colony Railroad Rehabilitation Project from Boston to Lakeville, Plymouth, and Scituate, Massachusetts, by U.S. Department of Transportation Urban Mass Transportation Administration and the MBTA. March 1992

  This project consists of restoration of commuter rail service between Boston and Middleborough, Plymouth, and Scituate in the southeastern area of Massachusetts. The purchase of rail equipment for the service is

part of the program. All facilities will be accessible to persons with disabilities.

- **Commuter Rail: I-495/Bellingham Extension**
  I-495/Bellingham Commuter Rail Extension Feasibility Study: Final Report, by Sverdrup Corp. December 1988

  Restoration of the Bellingham-Millis-Needham rail corridor. Right-of-way still exists from Needham Junction to Village Street in Medway, but from Medway west to Bellingham much of it has disappeared due to residential development. Potential station sites have been identified in Bellingham, Medway, Millis, Medway, and Dover.

- **Commuter Rail: Newburyport Extension**
  Restoration of Commuter Rail Service to the City of Newburyport: Final Report, by Cambridge Systematics, Inc., Fay, Spofford and Thorndike, Inc., Stull and Lee, Inc. April 1987
  Environmental Notification Form: Restoration of Commuter Rail Services to Newburyport, Massachusetts, by Ammann and Whitney, McGinley Hart and Associates, DeLeuw, Cather and Company. September 20, 1989

  This project consist of restoration of commuter rail service between Ipswich and Newburyport. The scope includes procurement of passenger equipment required for service restoration and access for persons with disabilities.

- **South Boston Piers Transit Project**
  South Boston Piers/Fort Point Channel: Transit Financing Study, by URS Consultants. June 1990
  South Boston Piers/Fort Point Channel: Transit Alternatives: Draft Environmental Impact Report, by URS Consultants. September 1989

  This project consists of the construction of a new transit line which will link the South Boston Piers area to the multi-modal transportation center at South Station. The line could eventually connect Boylston Station on the Green Line and the Chinatown Station on the Orange Line.

- **Red Line Northwest Extension (Alewife-Rte. 128)**
  MBTA Lexington Branch R.R. Right-Of-Way Study, by Vollmer Associates. 1986

  This project consists of the extension of the Red Line from Alewife Station to Route 128 in Lexington via the Lexington Branch railroad right-of-way. Stations are proposed for Arlington Center, Arlington Heights, Lexington Center, and Route 128.

- **Weston Access Study Park-Ride Program**
  Weston Access Study: Park-Ride Program South Side, Weston, Massachusetts, by Vollmer Associates. January 1991

  Feasibility study to provide direct access from Route 128 to a relocated site of Kendall Green Station in Weston. Recommendations include improvements that will provide long-term benefits for local streets, access to Route 128, and access to the expanded Kendall Green Station in Weston.

- **Low Floor Green Line cars**
  Technical Provisions For: No. Low Floor Cars, by MBTA. October 1991

  Report on provisions and requirements for low floor Green Line cars.

- **Second Major Airport**
  Second Major Airport Siting Study Phase I Summary Report, prepared by the Massachusetts Aeronautics Commission. August 1991
  1989 Massachusetts Airport System Plan, by Massachusetts Aeronautics Commission. June 1989

  These are reports on the proposed locations for new and expanded airports. A second major airport would require a mass transit connection.

- **Logan International Airport**
  Boston-Logan International Airport: Draft Generic Environmental Impact Report, by Vanasse Hangen Brustlin, Inc. December 1991

  The report describes the environmental effects of the Airport's operations and measures to mitigate adverse impacts. The report also projects operational conditions in the future. It is intended to provide a comprehensive, long-term planning context for Logan Airport and necessary ground transportation access.

- **MHD HOV Study**
  Work Program for Long-term Regional High Occupancy Vehicle (HOV) Analysis, August 2, 1990
  Work Program for Short-term High Occupancy Vehicle (HOV) Analysis, August 2, 1990
  Memorandum: From CTPS to MDPW, Re: Short-Term High Occupancy Vehicle (HOV) Analysis, December 30, 1991

  The above Memorandum documents the modeling of hypothetical HOV treatments on the Southeast Expressway, the Mass. Turnpike, I-93, and Route 1.

- **Boston Inner Harbor Water Transportation Study**
  Boston Inner Harbor Water Transportation Study, by TAMS Consultants, Inc. and Charles Norris. October. 1989. Prepared for Massport.

  The study defines a range of likely Inner Harbor passenger ferry services that might be viable over the next 20 years.

- **Logan Airport/Boston Harbor Water Transportation Study**
  Logan Airport/Boston Harbor Water Transportation Study, by TAMS Consultants, Inc., Charles Norris, and C. Raymond Hunt Associates, Inc. June 1988. Prepared for Massport.

  The above study was undertaken to determine the feasibility and potential of passenger ferry services in Boston Harbor, in order to alleviate vehicular congestion in and near Logan Airport and Downtown Boston.

- **Northeast Corridor Extension**

  $250,000 is included in the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) to study extending the Northeast Corridor across Boston. The Federal Transit Administration will be contracting with an engineering firm to evaluate potential routes through Boston from South Station to the Portland mainline.

- **Intelligent Vehicle Highway System (IVHS) Program for Metropolitan Boston**
  Request For Qualifications/ Proposal, January 31, 1992 MDPW

  The purpose of this project is to develop a comprehensive IVHS program that is appropriate to the needs of the Metropolitan Boston region and the downtown core.

- **Circumferential Transit**
  Circumferential Transit Feasibility Study, by TAMS Consultant, Inc. Currently in progress, MBTA

  A study of the feasibility of transit service in a circumferential corridor (to be identified through the planning process) within an approximate five mile radius of downtown Boston.

- **Washington Street Replacement Service**
  Environmental Notification Form filed in November 1990
  Notice of Project Change, by TAMS Consultants, Inc. Currently in progress, MBTA

Proposed electric bus service in the South End, and Roxbury, along the route of the old Orange Line, with potential connection to the South Boston Piers Transit Service.

- **New Bedford/Fall River Commuter Rail Restoration Project**
  Feasibility Study, by Louis Berger and Assoc. January 1990
  MBTA has selected a consultant to do environmental and design work.

The proposed extension of passenger service from the end of the existing Stoughton branch to the cities of New Bedford and Fall River.

- **Central Artery/Tunnel project Regional Transit Mitigation Program**
  Central Artery/Tunnel project Regional Transit Mitigation Program: Interim Report-Phase I Identification of Potential Mitigation Strategies, by Vanasse Hangen Brustlin, Inc., Multisystems, Inc. August 1991. Prepared for the MBTA.

In response to regional traffic growth and in anticipation of the CA/T project the MBTA is developing a plan to implement specific projects and services which will mitigate the impacts of construction.

- **Northeast Corridor Improvement Project: Electrification New Haven, CT to Boston, MA**

Volpe National Transportation System Center in a joint venture with Fredric R. Harris and Daniel, Mann, Johnson, and Mendenhall are preparing an EIS for the Federal Railroad Administration for the electrification of the Northeast Corridor from New Haven to Boston.

- **New York to Boston via Albany**

New York State and Massachusetts have formed an 18 member Bi-State High Speed Rail Task Force to monitor a $500,000 study of Magnetic Levitation and High Speed Rail service between New York City and Boston via Albany and Springfield. The consultant should be under contract by mid-April and results are expected by April, 1993.

- **New Passenger Service from Boston to Portland**

Included in the Intermodal Surface Transportation Efficiency Act of 1991 is a $30 million authorization to rehabilitate track in New Hampshire and Maine for the restoration of passenger rail service between Portland and Boston. Maine DOT has chosen Amtrak as the operator of the service and is negotiating with Guilford Transportation Industries, the track owner, at this time. It is expected that service will be restored by 1994.